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ARCHITECTURAL RECORD

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GOING PLACES

"I should think," remarked one of our helpful-suggestion friends recently, "that Sloane-Blabon Linoleum would be a perfect floor-covering for busses, railroad cars and other heavy-traffic vehicles." "WOULD be," we bristled, "it IS." It's used in so many different kinds of vehicles even an occasional traveler would have to be pretty nimble-footed not to step on it sooner or later. Busses of the Southwestern Greyhound Lines, U. S. Army planes, U. S. Navy cruisers and destroyers, railroad club cars, steamships, yachts—these are only a few means of transportation in which Sloane-Blabon Linoleum is used.

Lest you get the idea, however, that Sloane-Blabon Linoleum is ALWAYS going places we call your attention to its use in the kitchen (left) of a firmly rooted-to-the-ground apartment. Sloane-Blabon Linoleum is available in a wide selection of tasteful patterns and color combinations in contract and household weights at leading stores and linoleum contractors. Let us send you our "Linoleum Handbook," containing much information of value to architects. W. & J. Sloane Selling Agents, Inc., 577 Fifth Ave., New York. (May we also remind you that Linoleum is a product on which home-owners can borrow money under the National Housing Act.)

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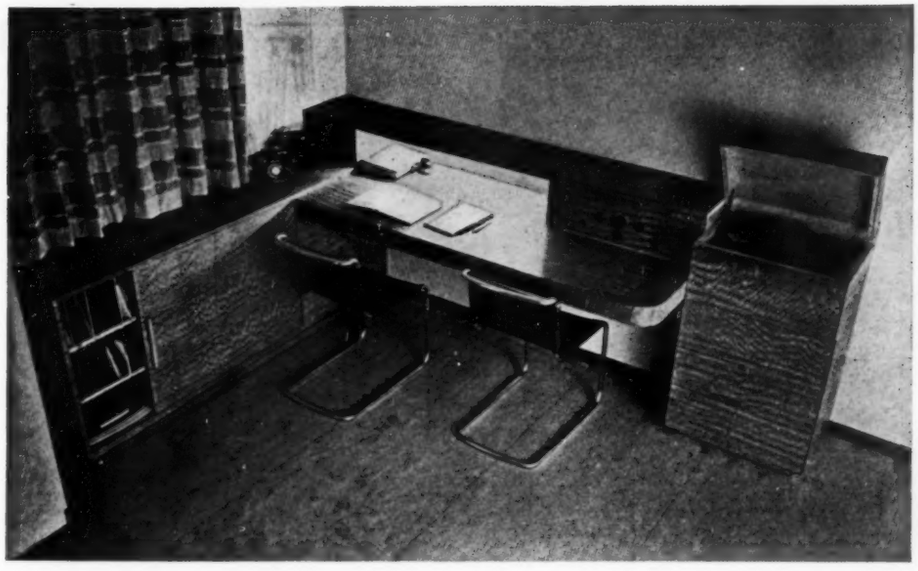
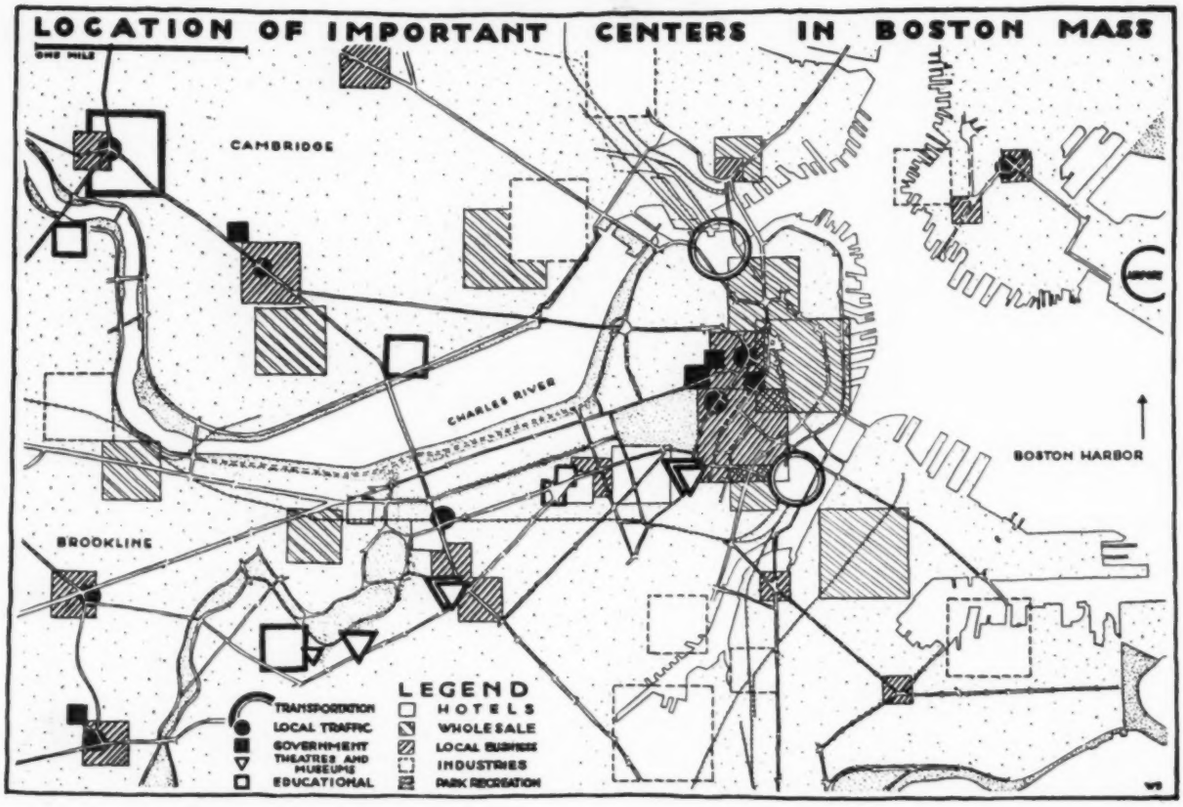


DAVEY RADIO SET MADE BY E. M. G. HAND MADE GRAMOPHONES AND INSTALLED IN A BACHELOR'S FLAT DESIGNED BY WELLS COATES.

From INDUSTRIAL DESIGN AND THE FUTURE
MESSRS. BOOTS BEESTON WORKS AT NOTTINGHAM, ENGLAND

INDUSTRIAL DESIGN AND THE FUTURE. *By Geoffrey Holme. The Studio Limited, 44 Leicester Square, London,* W.C. 2. *The Studio Publications, Inc.,* 381 *Fourth Avenue, New York City.* 80 *pages text,* 80 *pages plates.* $7.50

The author, editor of "The London Studio" for fifteen years, and a member of the Council of the Royal Society of Arts, of the Executive Committee for the Royal Academy Exhibition of British Art in Industry, 1935, and of the Board of Trade Council for Art in Industry, analyzes the needs of industry as well as means of supplying them and how these means can be improved. Training, education, organization; the capacity of the machine, and the place of the designer in industry are each considered. Mr. Holme sent a questionnaire to well-known advertising men, newspaper men, architects and engineers, manufacturers, and others, asking 15 questions such as: What in your view does Industry want from the Designer? How do you define good design, and have you found good design to be at variance with popular taste? By what system should designers be trained for and absorbed in industry? The signed answers to these and similar questions make interesting reading.



From THE DESIGN OF RESIDENTIAL AREAS

THE DESIGN OF RESIDENTIAL AREAS. *By Thomas Adams. Harvard University Press, Cambridge, Mass. 296 pages. Illustrated.* $3.50

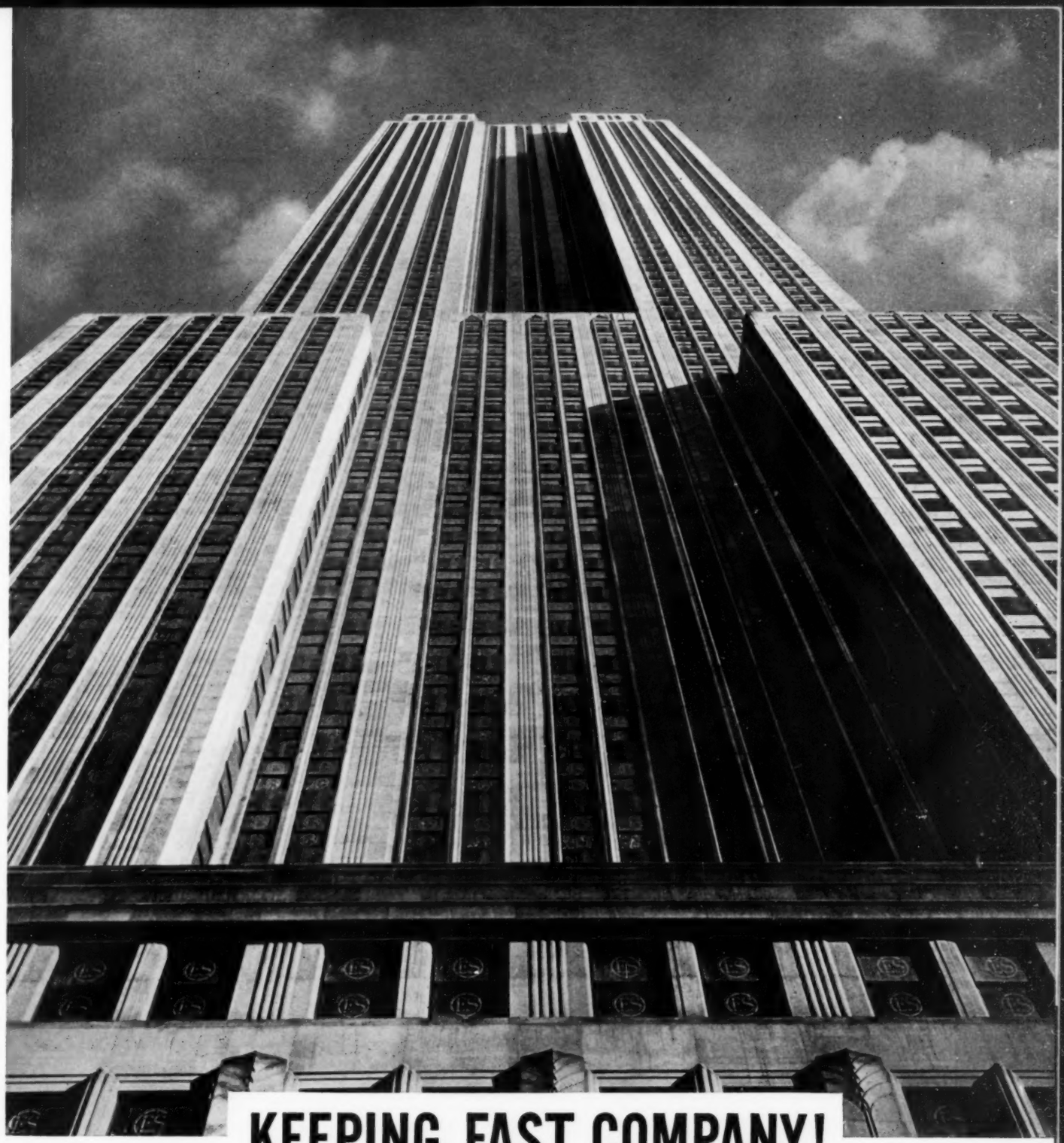
This book is Volume VI of the Harvard City Planning Studies, the five previous volumes being Airports; Building Height, Bulk, and Form; Neighborhoods of Small Homes; Urban Land Uses; Transition Zoning. Mr. Adams, a well-known town planner, has approached the problems of low-cost housing and slum clearance from a new angle, showing the origin and effects of blighted districts, stressing the fundamental need for comprehensive planning, and making practical suggestions of techniques which may be used to achieve the most economical and healthful living conditions for the average-income group.

HYDROTHERAPY IN HOSPITALS FOR MENTAL DISEASES. *By Rebekah Wright, M.D., Hydrotherapeutist, Massachusetts Department of Mental Diseases. The Tudor Press, Inc., 251 Causeway Street, Boston, Mass. 396 pages. Illustrated.*

Many architects and engineers have contributed to the author's knowledge of hydrotherapeutic construction and equipment, and Part IV of the book is for superintendents of hospitals for mental diseases who may wish to take up the subject of the construction and equipment of hydriatic suites with architects and manufacturers. The author has fitted model plans for general baths, tonic baths and sedative treatments into basement, first floor, and second floor, having the same dimensions for each floor. Detailed floor plans are given of these three divisions and recommendations made for walls, doors, floors, heat, light and ventilation. Although this book is essentially for the medical profession, the architect interested in this type of construction will find here all the information he may need.

MANUAL OF APPRAISALS. *By E. H. Boeckh, E. H. Boeckh & Associates, Appraisal Engineers. The Rough Notes Company, Inc., 222 East Ohio Street, Indianapolis, Ind. 271 pages. Illustrated.* $5 (*with a 10-day examination privilege*).

The manual is intended for use of architects, builders and engineers in making complete building and land appraisals. It contains extensive tables of cubic foot costs. The given figures are base prices, but multiplication with a local index number (which is furnished to subscribers at a nominal fee) gives the construction cost of the building at current local prices for materials and labor. There are general instructions on appraisal procedure for both field and office work, and a tabulation of cubic foot costs for 97 types of buildings, which are further subdivided into classes of construction and size. The price of the Manual includes a pad of Appraisal report work sheets, a request blank for local index numbers, and a bulletin giving the comparative building cost index numbers for ten types of construction in leading cities.



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CEMENT VS. LIME MORTAR

To the Editor:

RECENT research on the subject of leaky brick walls has been confined principally to the part in this problem played by different types of brick and mortar. The results of such research indicate that the water-tightness of a wall is controlled more by the absorption rate of the brick than by the properties of the mortar.* However, they also indicate that high water-retaining capacity in motar is of importance in obtaining a good bond.**

An article in *Rock Products,* September 10, 1932, by L. A. Palmer and D. A. Parsons, described in detail their work in connection with water-retaining capacity of mortars. A careful analysis of this article reveals the following facts about the mortars studied.

(1) *Highest water-retaining capacity* is found in two types of mortars:

(a) Those in which the cementing material is quicklime (slaked for a period of one week before use).

(b) Those in which the cementing materials are masonry cements made from natural cements, modified by the addition of stearates at the factory.

(2) *Lowest water-retaining capacity* is found in mortars in which the cementing material is Portland cement, without other materials.

(3) *Low water-retaining capacity* is found in mortars in which the cementing material is hydrated lime, not soaked before mixing. Such mortars rank only slightly better than Portland cement mortars. If the hydrated lime is soaked 24 hours before mixing, the water-retaining capacity of the mortar is improved. Even after such soaking, however, the water-retaining capacity of the mortar is not nearly so good as mortar made with either slaked quicklime, or with masonry cements as described above.

In a paper by Mr. L. A. Palmer, published in the June, 1934, issue of *Brick and Clay Record,* he describes the characteristics in mortar which he believes contribute to dry walls. In this article he states, "Of the materials that are today available which provide hese necessary properties, there are certain modified natural ecments . . ."

Brixment, manufactured by the Louisville Cement Co., is just such a modified natural cement with calcium stearate added at the factory. It possesses the desirable mortar characteristics to an excellent degree.

It must be admitted, however, that the selection of the proper mortar is of less importance than certain other precauions which must be taken to insure dry walls. These precautions are explained and their relative importance emphasized, in the article "Leaky Brick Walls and How to Prevent Them," which appeared in the December, 1932, issue of THE ARCHITECTURAL RECORD. This can be secured, together with copies of the reports mentioned in the footnotes below, by writing the Louisville Cement Co., Incorporated, Louisville, Kentucky.

JOHN H. MALLON
Louisville Cement Co.

**Permeability Tests of 8-Inch Brick Wallettes* by L. A. Palmer and D. A. Parsons.

"In the tests as conducted, the water-tightness of the test wallettes was controlled more by the brick than by the mortar properties."

***The Properties of Mortars and Bricks and Their Relation to Bond* by L. A. Palmer and D. A. Parsons.

"The data indicate that the water-retaining capacity of mortars and absorption rate of bricks were of primary importance in obtaining a good bond."

IN THIS ISSUE

The reader who finds the Technical News and Research article (pages 377-384) by L. A. Palmer—"How Mortars Contribute to Dry Walls"—of practical interest is urged to consult several other noteworthy articles which The Record has published on this topic:

(1) "Making Brick Walls Watertight," by Stanley Newman, July 1930, pages 78-96.

(2) "Can Brick Wall Construction be Made Watertight?" by Dr. F. O. Anderegg, September 1931, pages 201-214.

(3) "Leaky Brick Walls," by John H. Mallon, December 1932, pages 412-416.

Mr. Mallon informs us that reprints of his own article can be secured by writing to the Louisville Cement Co., Louisville, Kentucky. He also states: "Recent research on the subject of leaky brick walls has been confined principally to the part in this problem played by different types of brick and mortar. The results of such research indicate that the watertightness of a wall is controlled more by the absorption rate of the brick than by the properties of the mortar. However, they also indicate that high water-retaining capacity in mortar is of importance in obtaining a good bond."

NEXT MONTH

STORE PLANNING

In both modernization and new construction the problem of planning the store is complete owing to the tremendous changes in distribution of food and goods. New types of markets and stores have been created specifically to simplify purchases. Lighting, ventilation, display, storage and store construction are items presented in this article as the latest information and approved practice.

ZOOLOGICAL BUILDING IN CHICAGO

Chicago has just completed a series of important buildings in its parks to house fur-bearing and feathered creatures of all sorts. The group is located at Brookfield, Illinois, near Chicago. The planning of these shelters was the work of the architectural firm of Edwin H. Clark, Inc., Chicago.

PORTFOLIO OF BUILDINGS DEVOTED TO RECREATION

Park Buildings of Long Island State Park Commission. Sports Arena, Wembley, England.

POST OFFICE BUILDING, CHATTANOOGA, TENNESSEE.

R. C. Hunt and Company, architects; Shreve, Lamb and Harmon, consulting architects.

POLAR BEAR PIT AND ELEPHANT HOUSE IN CHICAGO ZOO—EDWIN H. CLARK, INC., ARCHITECTS

Photographs by Trowbridge

NEWS OF THE FIELD

R. F. Beresford, architect, has moved from 1115 Connecticut Avenue, N.W., to 1713 K Street, N.W., Washington, D. C.

J. Andre Fouilhoux, architect, announces that following the death of Raymond M. Hood he will assume the unfinished business of the firm of Hood and Fouilhoux and continue the practice of architecture at 40 West 40 Street, New York City. The work in progress will be carried under the firm name of Hood and Fouilhoux and new work under the name of J. Andre Fouilhoux.

Barber and McMurry, architects, announce the removal of their offices from the General Building to the Wright-Cason Electric Company Building, 517 West Church Avenue, Knoxville, Tennessee.

Robert Stanton Everitt, architect, has reopened his office at 1013 Grand Avenue, Kansas City, Missouri.

The firm of Larrick and Compton, architects and engineers, has been dissolved. Thomas Larrick announces that he is carrying on the practice of architecture, as successor to the old firm, under his own name, Thomas Larrick, architect and engineer, 816½ Massachusetts Street, Lawrence, Kansas.

An exhibition of drawings by Otto F. Langman, member of the firm of Hobart Upjohn, was held at the Ferargil Galleries, 63 East 57 Street, New York City, October 15-28.

The Association of the Alumni of the American Academy in Rome will hold the ninth annual collaborative competition for architects, landscape architects, painters, and sculptors during the period of nine weeks from November 17 to January 18. Copies of the program will be distributed among the schools early in November. Through the generosity of the American Pencil Company, makers of Venus Drawing Pencils, the Association is able to announce the "Venus Pencil Awards," or prizes of $300, $150, and $75, respectively, to be awarded to the three teams whose designs are rated highest by the jury. Mr. J. K. Reckford, Executive Vice-President of the American Pencil Company, announces that these Venus Pencil Awards are *annual* awards (rather than one-time). The competition is open to any group of students of art, or to any one employed in offices or studios. Those desirous of entering the competition should communicate with the Association of the Alumni of the American Academy in Rome, 101 Park Avenue, New York City.

A Modern Home Exposition, sponsored by the city and indorsed by the Chamber of Commerce, will be held in St. Louis' new Municipal Auditorium, November 10 to 18, inclusive. A better housing program will be undertaken in connection with the exposition by the Chamber of Commerce which will have 1,000 house-to-house canvassers to stimulate interest in home improvement.

Announcement is made of a mural painting competition by the Ever Ready Label Corporation, 141 East 25 Street, New York City, for the decoration of its new offices. Julian Clarence Levi, architect and past president of the Architectural League of New York, Miss Hildreth Meiere, painter, and Sidney B. Hollaender, President of the Ever Ready Label Corporation, will be among the jury which will select four schemes from those submitted by all competitors. The authors of these four schemes will then enter into a final competition which may entail the restudy of their designs, in view of possible suggestions of the jury and also the submission to the jury of a full-size section of the decoration in color. The winner of this final competition will receive the commission to paint the murals, for which he is to receive $500, exclusive of costs of materials and mounting. The remaining three artists will receive $75 each for their work. The program for the competition is available at the offices of the Ever Ready Label Corporation.

The International Industrial Relations Institute will hold a regional conference on *Social Economic Planning* in New York (Russell Sage Foundation Building, 130 East 22 Street) from Friday, November 23, through Monday, November 26. Because of space limitations, preference in attendance will be given to persons who will be able to use the materials of the conference to spread understanding—all those who teach, write, lecture, or organize activities dealing with economic and social issues. Apply to the IRI, Room 600, 130 East 22 Street, New York City.

Prize winners in the *House Beautiful* seventh annual small house competition: Class I—Houses of eight rooms and under: First prize of $500 to Harvey Stevenson and Eastman Studds, New York; second prize of $300 to William Wilson Wurster, San Francisco. Class II—Houses of nine to twelve rooms: First prize of $500 to H. Roy Kelley, Los Angeles; second prize of $300 to Waldron Faulkner, New York. Class III—Houses exemplifying new construction and non-period design: Special prize of $300 to Richard J. Neutra, Los Angeles. Honorable mention to: Roland E. Coate, Los Angeles; Michael Goodman, Berkeley, California; Harwell H. Harris, Carl Anderson, associate, Los Angeles; H. Roy Kelley, Los Angeles; Bertha Mather McPherson, Darien, Connecticut; Warren Charles Perry, San Francisco; Palmer Sabin, Pasadena; Penrose V. Stout, Bronxville; Royal Barry Wills(2), Boston; David J. Witmer and Loyall F. Watson, Los Angeles.

CALENDAR OF EXHIBITIONS AND EVENTS

Until November 5	Housing Exhibition at Museum of Modern Art, New York City.
November 5-11	American Education Week.
November 10-18	Modern Home Exposition, St. Louis Municipal Auditorium.
November 14-January 15	Fifth Anniversary Exhibition at Museum of Modern Art, New York City.
Until December	Remodeling Competition, conducted by the Good Housekeeping Studio, 57th Street and Eighth Avenue, New York City.
December 3-8	Eleventh National Power Exposition, at Grand Central Palace, New York City.
January 18	Closing date of ninth annual collaborative competition for architects, landscape architects, painters and sculptors, held by Association of the Alumni of the American Academy in Rome, 101 Park Avenue, New York City.
Until January 26	"Art in America" programs broadcast every Saturday night over Station WJZ and national network.
January 30-March 7	Exhibition of work of George Caleb Bingham, Gaston Lachaise, and Henry Hobson Richardson, at Museum of Modern Art, New York City.
March 18-May 14	Exhibition of African Art, Museum of Modern Art, New York City.

WHAT IS MODERN ELEVATOR PRACTICE IN OFFICE BUILDINGS?

SIGNAL Control Elevators, first installed in the Standard Oil Building in New York City and since furnished by the Otis Elevator Company for over 350 other high-class office buildings, are now so generally recognized as the accepted standard for modern office buildings that, in recent years, few such buildings have been equipped with any other type of control. Improvements and simplification in design and construction have not only materially reduced the cost of Signal Control but have added so greatly to its flexibility that its field of application has been rapidly extended to embrace the six-story office building as well as the towering skyscraper.

The tremendous advantages of Signal Control from the standpoint of both quantity and quality of elevator service have been so thoroughly established that to install anything but Signal Control in even a moderate-size office building is to risk elevator obsolescence before the building is completed.

For all but intermittent service elevators in low-rise office buildings, gearless machines with Unit Multi-Voltage and two-way self-leveling are taken for granted by most owners, architects and tenants of modern office buildings. Maximum smoothness, convenience and passenger-handling ability require in addition Otis Signal Control which, with recent refinements, now offers the following outstanding characteristics:

1. The pressing of a hall button by a prospective passenger automatically stops the first available car traveling in the desired direction.

2. An audible gong and a hall signal lantern advise the waiting passenger which car will stop and sufficiently in advance of the arrival of the car to permit the passenger to move without unusual haste to the proper opening. The interval by which the light precedes the arrival of the car is adjustable within ample limits to permit each installation to be arranged with that light interval best suited to the requirements of the building. This is a notable advance in the Elevator Art and is accomplished without sacrificing the all-important requirement that only the light corresponding to the car that is to stop shall be illuminated.

3. The car and hatchway doors open automatically as the car stops level with the floor.

4. The car stops automatically at the floor corresponding to the button pressed by the attendant in the car.

5. Excellent service is assured independently of the skill or memory of the operator. False stops are eliminated and the possibility of failing to stop for a waiting passenger is avoided.

6. The control is so arranged that when desired the cars will stop and reverse automatically at the point of highest call. During the morning peak period this new and important improvement adds considerably to the passenger-handling capacity of the elevators, as the time required to travel unnecessarily above the highest point for which there is a car or hall call is completely eliminated—round-trip time is reduced and more trips from the ground floor can be made during the period of intensive service.

This same arrangement, which also includes a buzzer in the car, makes every car available for night service without the additional complication of a night service annunciator.

7. To assure the maximum service of which an elevator installation is capable, it is necessary that they be dispatched with the proper interval and in proper sequence—all of which is accomplished with a minimum of attention on the part of the starter by the Otis Scheduling Device.

The number, capacity and speed of elevators required to provide adequate elevator service in a modern office building can best be determined by taking advantage of the wealth of information assembled by Otis Engineers and based upon extensive tests in existing buildings. All Otis offices are equipped to give complete and detailed information on the subject of proper elevator equipment for all types of buildings, and this service is available to architects and engineers without obligation.

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ADMINISTRATION OF TITLES II AND III OF THE NATIONAL HOUSING ACT

THE Federal Housing Administration made public on November 1 a general outline of the plan of operations under Titles II and III of the National Housing Act, which deal with residential mortgage financing. These portions of the act provide the legal basis for the long-range program of the Federal Housing Administration as distinguished from the Modernization and Improvement Program which, under Title I, has been going on since August 10, and which will terminate by statutory limitation at the end of 1935 unless extended by Congress.

The salient points of the long-range program are:

This is the first time in the history of finance that a uniform basic interest rate has been applied to private capital in the United States. Heretofore both the legal interest rates by states as well as the prevailing rates have varied.

An opportunity to owners of dwellings to refinance their mortgages on more favorable terms, and to prospective owners to obtain financing on terms comparable to the payment of rent.

Mutual insurance of mortgages on existing or new dwellings in amounts up to 80% of appraised value, for as much as $16,000, for periods up to twenty years, and with the privilege of payment by regular periodic installments.

Loans on such insured mortgages to be made by lending institutions, such as banks, building and loan associations, insurance companies, and loan and trust companies, which are able to qualify as mortgagees approved by the Federal Housing Administration.

The Act authorizes variation in interest rates on insured mortgages from five per cent to six per cent. A basic maximum of five per cent other than for refunding, where five and a half per cent will apply, is fixed in the regulations.

Insurance premiums will vary from one-half of one per cent of the original face amount of the mortgage, on new financing, to one per cent per annum on refunding.

Regular periodic payments on principal will be required at a rate sufficient to pay off the mortgage at its maturity.

Only mortgages on dwellings designed for from one to four families will be eligible for insurance, except such mortgages as can qualify under Section 207 of the Act as low-cost housing projects.

It is provided in the National Housing Act that: "No mortgage shall be accepted for insurance . . . unless the Administrator finds that the project with respect to which the mortgage is executed is economically sound." Consequently, the dwellings on which mortgages are insured must be well located in urban communities.

Under Title III of the Act, provision is made for the establishment of National Mortgage Associations, each with a paid up capital stock of at least $5,000,000, privately subscribed, whose business it will be to purchase insured mortgages and issue debentures against them for sale to the public.

It was explained that mortgage loans will not be made by the Federal Housing Administration itself but by the various existing institutions designated as approved mortgagees. An approved mortgagee in a mortgage otherwise eligible for insurance under this Title, shall: (1) be a chartered financial institution whose activity in the residential mortgage field is principally that of loaning funds under its own control; (2) have succession for not less than twenty years beyond the date of the application for insurance of the mortgage; (3) be subject to supervision by the governmental agencies from which its charter powers are derived; (4) have an unimpaired capital of not less than $100,000; (5) have its principal office in a city or town of not less than 6,000 population according to the United States Census of 1930; and, in all other respects be responsible and able to service the mortgage properly.

Designation of such institutions as approved mortgagees is subject to their application and approval.

The above classification includes among others National and State Banks and Trust Companies, Mutual Savings Banks, Mutual Building and Loan Associations, Life Insurance Companies and other such institutional investors; and, subject to the qualifications described above, such institutions as are otherwise eligible as members of the Home Owners' Loan Bank and the Federal Deposit Insurance Corporation.

Nothing in the Act restricts a mortgagee in the selection of its employees and/or agencies by which such proper servicing is attained. The mortgagee is the applicant to the Administrator for the mortgage insurance and is obligated to the Administrator for the annual premium.

Only original mortgagees, other approved mortgagees, National Mortgage Associations, and such investors in mortgages as may be hereafter provided for by regulations and approval, may hold title to mortgage insurance under this Title.

To qualify under an insured mortgage:

1. The borrower must have a regular income reasonably assured of continuance, sufficient to meet all periodic payments as they fall due without being obliged to cut down on other essential living expenses. Generally the payments for interest, insurance premium and amortization combined should not amount to a sum substantially larger than the borrower could afford to pay for rent if he did not own the property. For it must be remembered that he will have to bear the cost of maintenance and insurance and taxes on his property—items which as a renter he would not be required to pay.

2. The loan must be for not more than $16,000.

3. The loan may be for as much as 80% of the appraised value of the property, although the prospective purchaser of a home should be prepared to borrow less than this, if possible. Moreover, the purchase price or the appraised value must represent the real value of the property.

4. The loan may run for as long as twenty years and must be fully amortized. That is, the borrower must contract to make regular periodic payments, in addition to the other charges, which will accumulate at compound interest into a sum sufficient to pay off the mortgage by the time it falls due.

5. Interest rates, service charges, and premium for mortgage insurance under Title II at present are fixed in the following classifications and rates:

a. Financing without change of lender, bona fide sale or resale of property existing on June 27, 1934, interest rate not to exceed five per cent per annum, no service charge allowed, and mortgage insurance premium one-half of one per cent per annum.

b. Loan to borrower for financing acquisition by him of property constructed after June 27, 1934, interest rate not to exceed five per cent per annum, service charge one-half of one per cent per annum, and mortgage insurance premium one-half of one per cent per annum.

c. Refunding of present indebtedness, without change of borrower or lender, on property existing on June 27, 1934, interest rate not to exceed five and one-half per cent per annum, no service charge, and mortgage insurance premium one per cent per annum.

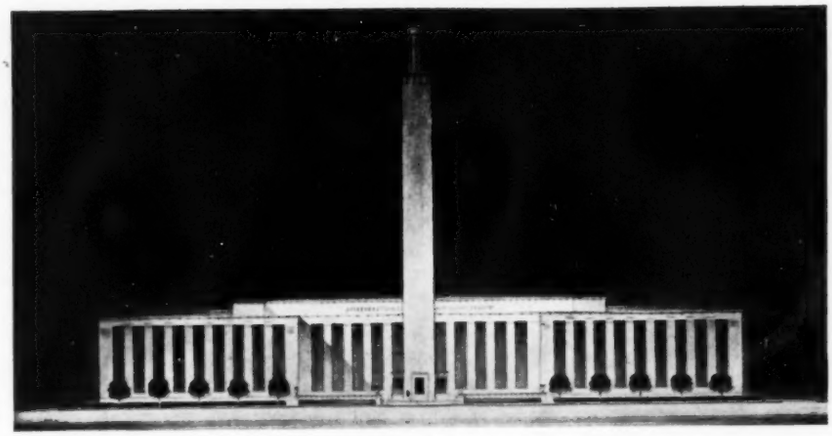
d. Refunding of present indebtedness, with change of lender, on property existing on June 27, 1934, interest rate not to exceed five and one-half per cent per annum, service charge one-half of one per cent per annum, and mortgage insurance premium one per cent per annum.

6. Mortgage insurance premiums will be charged on the original face value of the mortgage. These will be collected at the same rate until the mortgage is fully paid off. Meanwhile, however, the premiums will accumulate at compound interest and substantially all that is not required to pay insurance losses and expenses of administration will be returned in the form of a credit on the principal of the mortgage, which will result in complete payment of the debt before it finally falls due.

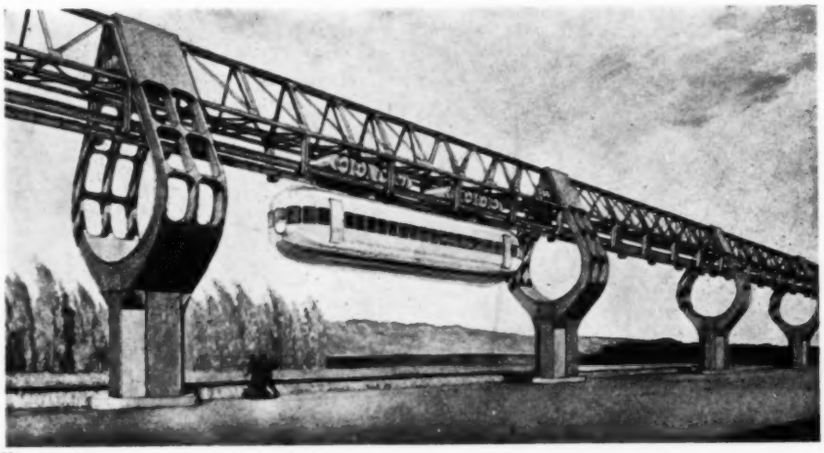
7. On a twenty-year 5% mortgage, the payments on principal required to liquidate it when due would begin at the rate of 3% per year on the original amount borrowed. Interest and principal payments combined would amount to 8% a year on the original amount borrowed throughout the life of the mortgage—that is, for approximately twenty years—at the end of which period the loan would be completely paid off. This combined rate of 8% results from the fact that as interest payments decrease, because the amount of the loan outstanding is being reduced year by year, principal payments are increased by an equivalent amount. In addition would be the mortgage insurance premium, of one-half of one per cent, or one per cent per annum, depending upon whether the mortgage was for new financing or for refunding.

8. No mortgage will be eligible for insurance with respect to which there remains, or is in the contemplation of the mortgagor, any secondary liens upon the property at the time of the execution of such mortgage; it being required that in every instance the mortgagor shall have, at the time of the issuance of the insurance, an equity of not less than 20% in the mortgaged property.

Insured mortgages will be first liens and in case of necessity may be taken in amounts up to 80% of the appraised value of the property, thus making secondary financing unnecessary.



Winning design in a limited competition for a new building group for Northwestern University in Boston. Coolidge, Shepley, Bulfinch and Abbott, architects.



Keystone

A drawing by the chief engineer of the Golden Gate Bridge, under construction in San Francisco, suggesting the use of elevated trains to travel at 100 miles an hour in safety.

Keystone

Delegates to the Convention of the National Housing Association in Washington on October 12 (left to right): Charles Bennett, City Planning Engineer of Milwaukee; Ernest J. Bohn (Cleveland), President of the National Housing Association; Alfred K. Stern (Chicago), Chairman of the Illinois State Housing Board; Sidney T. Strickland (Boston), Chairman of the Massachusetts State Housing Board, and John Ihlder (Washington), Secretary of the District of Columbia Housing Board.

ILLUSTRATED NEWS

NEW GLASS TAKES HEAT OUT OF SUNLIGHT

New developments in the science of glass making for windows and skylights which take the "heat" out of sunlight but allow the light to pass were described at the October meeting of the Illuminating Engineering Society in Baltimore. Improvements in heat-absorbing glass, it is believed, will aid greatly the torrid conditions in Southern textile mills and other manufacturing plants during mid-summer.

The new heat-absorbing glass, according to a Science Service report, contains iron. Objects viewed through it have a faint greenish-blue color because some of the red rays of the sunlight have been removed. Small amounts of iron in glass absorb ultraviolet and infrared, or heat, rays of sunlight. The visible part of sunlight, it is explained, contains only one-third of the heat in the sun's rays. The heat-absorbing glass cuts out as much of the invisible but hot 66 per cent as possible. At the same time, however, the visible rays are reduced as little as possible.

Describing the transmission of sunlight by these new type glasses, Dr. Roger S. Estey, physicist of the Electrical Testing Laboratories, New York City, and Dr. Robert A. Miller of the Pittsburgh Plate Glass Company, reported that 52 per cent of the heat in sunlight is stopped and absorbed by the iron-containing glass. Eight per cent is reflected off the front surface to the outside. The rest as visible light must be allowed to come through if the room containing a heat-absorbing window is to be illuminated by sunlight.

In practice it would be possible to conduct away much of the heat absorbed in the new-type glass windows by ventilation. What remains behind is re-radiated by the window; half to the outside and half into the room.

While the heated window might be expected to raise the temperature of the room as a whole, the effect on a workman in the direct sunlight would be much less than for ordinary glass. The re-radiated heat is given off in all directions from the window pane. Only the small part blocked out by the body of a workman would warm him. With normal glass the direct beam of the sun would make him much hotter and more uncomfortable.

Dr. H. P. Gage, chief of the Optical Laboratory of the Corning Glass Works, reporting on the same topic, suggested that the slight greenish appearance of objects when viewed through heat-absorbing glass might be overcome by combining with it a filter having a slight purple color. This would correct the faint greenish appearance of the objects and simulate more normal conditions.

The increase in the use of shatter-proof windshields for automobiles can claim some share in the credit for developing heat-absorbing glass for windows. It will be recalled that only a year or two ago the "sandwich" windshields of two layers of glass inclosing a layer of celluloid turned brown and colored with time. It was found that the action of the ultraviolet and infrared rays in sunlight was responsible for this coloring. In an attempt to discover some glass which would prevent windshield discoloring, scientists found they had to cut out these special rays. In so doing they were really producing a heat-absorbing glass. In the same sense, the heat-absorbing glass filters used in motion picture projection room equipment deserve their share of credit.

1 *Wide World*

2 *Wide World; ©Aero Service Corp.*

(1) Harold L. Ickes, Secretary of the Interior, about to throw the switch starting the work of demolishing a building in Atlanta, Ga., marking the start of the work being conducted in the elimination of slum sections in the country.

(2) Aerial view of the Washington Triangle, a government building unit measuring ten blocks long and five blocks on its base. The group was authorized by the Coolidge Administration and is now rapidly nearing completion under the Roosevelt régime. In the foreground, forming the base of the Triangle, is the new Department of Commerce Building, situated on Fifteenth Street. Along the side (Constitution Avenue), looking toward the apex of the Triangle, are, successively, the Interstate Commerce, Internal Revenue, Justice and Archives Buildings. Looking from the base along Pennsylvania Avenue are the Customs Building, the new Post Office and the old Post Office.

(3, 4) Coulee City—the boom town at the site of the Grand Coulee Dam, now being built in Washington. The government is spending $63,000,000 on the first of two dams in this reclamation project.

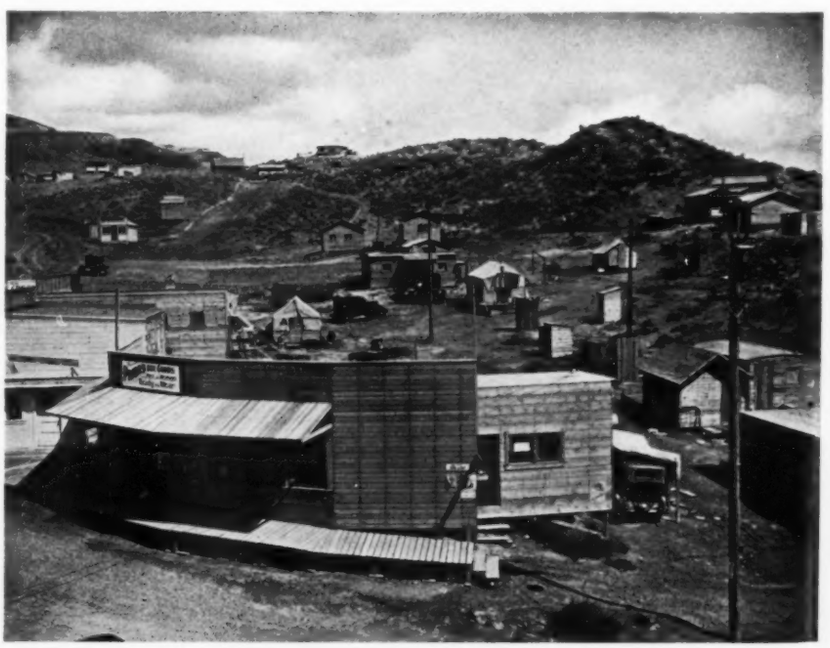
3, 4 *Ewing Galloway Photographs*

AIR CONDITIONING IN HOSPITALS

Air conditioning has practical value as an addition to treatment facilities in hospitals, but at the present time it is too costly to be used throughout all or a large part of a hospital. When further perfected, however, air conditioning is likely to find a very definite place in hospital construction and operation.

This is the substance of a committee report made at a recent meeting of the American Hospital Association in Philadelphia. Chairman of the committee is Dr. C. W. Munger, director of Westchester County (New York) Department of Hospitals and Grasslands Hospital. Other members of the committee are: Dr. Lucius Wilson, John Sealy Hospital, Galveston, Texas; Charles F. Neergaard, engineer and hospital consultant; Perry W. Swern, hospital architect.

Most feasible use of air conditioning in hospitals at present consists of its use in single room units of the simpler type for the use of individual patients especially needing it. "Installation of complete air conditioning equipment for entire buildings more than doubles the cost of heating and ventilating work," the committee found. "The annual maintenance of an air conditioning plant for a given building is considerably greater than the cost of heating the same building without air conditioning." For a given building, the cost of heating without air conditioning was estimated at $19,000. The cost of heating plus air conditioning was estimated at $42,000.



GABRIEL FERRAND: A TRIBUTE

The enthusiasm of Gabriel Ferrand combined with his capacity for hard work carried him far in the fields of architecture. His pioneering spirit was responsible for his leaving his native land for the purpose of inculcating into the minds of the students of his adopted country the fundamental principles of planning and designing as developed by the Ecole des Beaux Arts.

His breadth of vision enabled him to absorb the spirit of American institutions and to make him one of us. While primarily a designer he was thoroughly convinced that the schools of architecture needed greatly to broaden their curriculum in order that the graduates might be more thoroughly prepared for the ultimate practice of their profession.

He was indefatigable in his efforts to create and develop the Association of Collegiate Schools of Architecture, and he was greatly elated over the program fostered by the Association at its convention in Washington in May of this year, and the cooperation of the State Registration Boards and the American Institute of Architects, which in substance widens the field of study so as to comprehend all of the branches that enter into the practice of architecture.

He was convinced that the resolution calling upon practicing architects to act as mentors for students for a period of three years after graduation would be most influential upon students as he considered the benefits to be derived would be far reaching not only upon the students themselves, but upon the future of architecture in this country.

He deplored the general lack of appreciation of architecture on the part of the public and believed that the architects themselves were partially to blame for this lack of understanding. As an attempt to correct this situation he had arranged with Mr. H. J. Gerling, Superintendent of Public Schools in St. Louis, for a series of talks on architecture that were to be delivered to the high school students as he felt this was a part of a broad educational policy.

The architectural profession incurs a real loss because of his death, and the American Institute of Architects mourns the passing of one of its influential members.

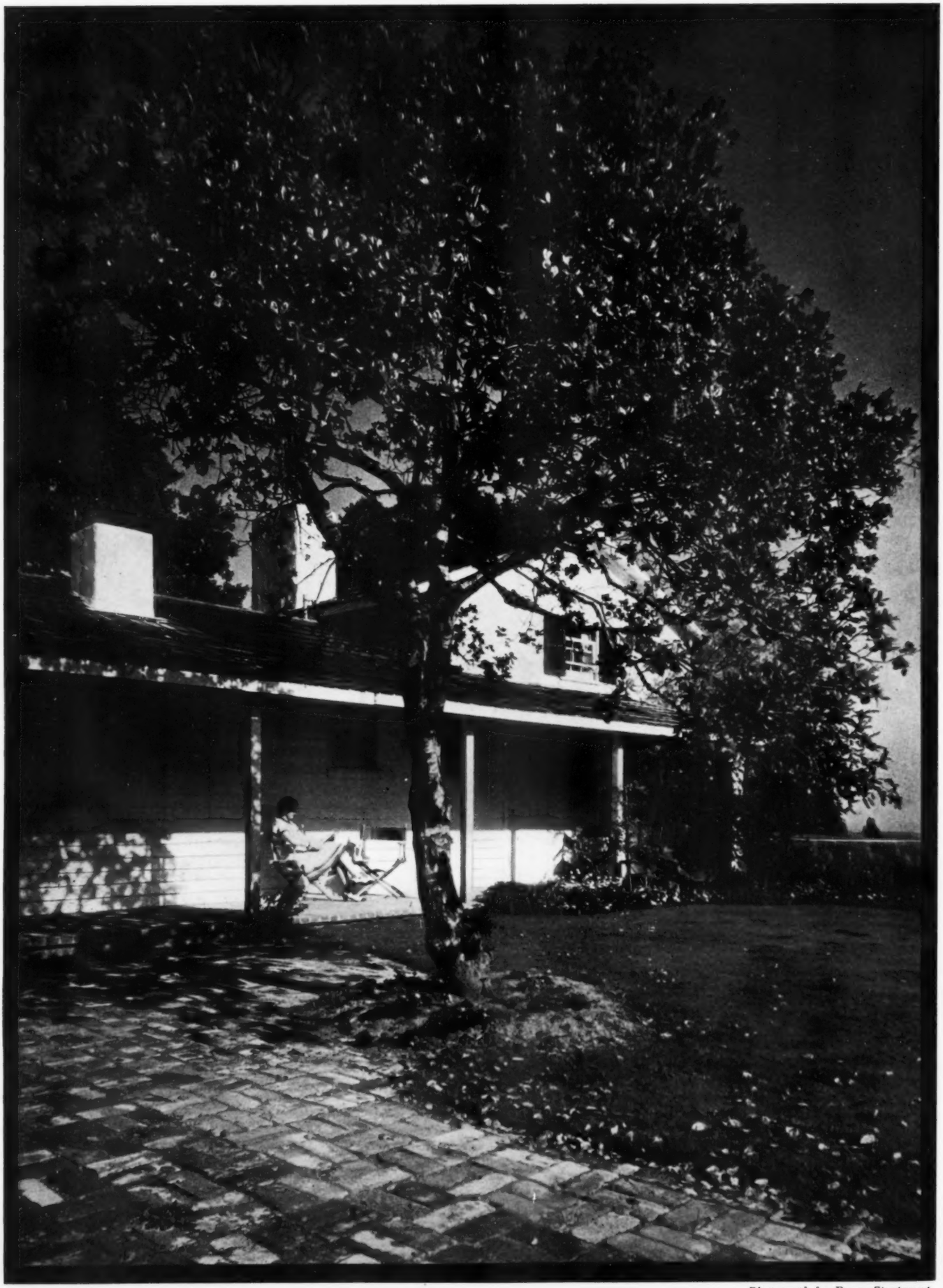
Gabriel Ferrand's death was an untimely one because he had not yet reached the full measure of his development. Therefore it falls upon the shoulders of those of us who survive him to carry on the ideals that he set up as his own standard.

Ernest John Russell, President,
American Institute of Architects.
October 10th, 1934.

In 1915, *after teaching in the Carnegie Institute of Technology at Pittsburgh, Gabriel Ferrand took charge of instruction in design in the School of Architecture, Washington University, St. Louis. Under his direction the classes grew in size until their quarters became inadequate. In response to this need the Gevins Hall of Architecture was erected.*

He designed important public buildings in the East, particularly Brooklyn and New York. In St. Louis and throughout Missouri, Mississippi, Texas, West Virginia and other southern states are to be found many churches and schools, monumental gateways and residences, which he produced. He served on commissions and advisory committees concerned with the St. Louis Municipal Auditorium and Convention Hall, the St. Louis Plaza, and Jackson Park in University City.

GABRIEL FERRAND



Photograph by Roger Sturtevant

HOUSE OF E. E. KAPLANSKY AT SANTA CRUZ, CALIF. . . . WILLIAM WILSON WURSTER, ARCHITECT

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ARCHITECTURAL RECORD

COMPLETE RECOVERY OF BUILDING INDUSTRY REQUIRES PROPOSED DISCOUNT FACILITIES OF NATIONAL MORTGAGE ASSOCIATIONS

By WALTER S. SCHMIDT

Mr. Schmidt, President-elect of the National Association of Real Estate Boards, spoke in favor of the National Housing Bill before the Senate Committee on Banking and Currency. However, as chairman of the Mortgage Finance Committee of the National Association of Real Estate Boards, he advocated that the discount facilities provided by the Home Loan Bank and the insurance contemplated by the Housing Bill for mortgages on homes of $20,000 or less be extended in principle to mortgages on other types of real estate, and submitted a draft for a Federal mortgage discount corporation to be added as a separate title to the Housing Bill. The proposed title was not accepted, but the National Housing Bill as enacted permits the formation of National Mortgage Associations, which are authorized to provide discount facilities for all types of mortgages. Since Mr. Schmidt's article was written, announcement has been made that the RFC is ready to participate in furnishing capital for such associations.

THE new National Housing Act is designed primarily to make the home mortgage a more attractive investment by providing quasi-Federal insurance for the protection of the lender in case of default. The rehabilitation and remodeling feature, to the organization and promotion of which the Housing Administration at the moment is devoting itself, is a temporary expedient. In its major intents, the act is concerned with recreating a flow of mortgage money, without which no extensive new home building program is possible; it likewise seeks to make ownership—hence new building projects—more attractive by lessening the interest rate to the

borrower and by eliminating undue junior finance costs through the insurance of eighty per cent loans.

Past failures of the mortgage insurance idea furnish no proper criterion for judging the success of the plan proposed in the Housing Act. These observations might be made: that many of those formerly engaged in the business of selling guaranteed mortgages were more interested in the promotional fees than in the security of the mortgage itself; that others insured bond issues of mortgage companies for the sake of an annual differential without themselves possessing knowledge of the field or facilities for investigating the real estate involved; and that better practice resulting from the nature of the quasi-Federal Insurance Corporation and the commencement of operations in this present period of deflated values, are auguries for success.

Undoubtedly, sound insurance is a most attractive feature to the investor and there is an optimistic feeling in administrative circles that many new sources of investment will be tapped through the fact that the corporation is quasi-Federal and that the Government has at least the moral obligation of supporting its insurance. Likewise, in many states, legislation either has been introduced or is in process of preparation liberalizing the laws so that the proposed insured mortgage up to eighty per cent of value may become a legal investment for financial institutions and trust estates. The Act itself amends the Federal Reserve Act, removing certain restrictions hitherto applying to action in real estate mortgage matters, and further permits the Home Loan Bank to lend members ninety per cent of the face of an insured mortgage.

It is beyond dispute that the interest rate on mortgages must be decreased if real estate ownership is to preserve any comparatively desirable position in relation to other forms of investment. Home ownership is the bulwark of a democratic form of government and must be encouraged, yet the rate on the home mortgage, recognized as the safest of all investments when conservatively placed, has exceeded the yield on almost every other type of secured loan. Capital wherever safely placed must be satisfied with lesser returns than it heretofore has enjoyed; there is recognition of the fact that it has taken too great a proportion of the productivity of human beings. Our country in addition has ceased to be a frontier nation requiring more capital than it possessed for new enterprise and expansion. It has ample money resources and its state of stabilization normally will tend to reduced interest returns. Real estate must not be laggard in recognizing this tendency.

The Housing Act points the way by endeavoring first to make the mortgage more attractive and then to reduce the return upon it to the investor. The Act provides a five per cent rate plus the cost of insurance, which is fixed at a minimum of one-half and a maximum of one per cent. In some sections this presents no great advantage, but in others the interest rate is standard at six and one-half, seven, eight and in some localities even nine per cent. As the insurance idea gains acceptance, standardization of rate and practice will come and with it reduction below the five per cent base now fixed.

Question has been raised as to whether an eighty per cent loan can be made with safety. Any substantial home builder will testify that losses under such mortgages on new construction have been negligible. In practice such large percentage to value probably will not be loaned except on new homes. The great advantage of a seventy to eighty per cent mortgage is that it will eradicate what in many communities was a scandalous abuse, the adding of large amounts to fair sale price in order to take care of the undue costs of junior finance. The builder could not carry the paper himself and was forced to arrange its sale at a substantial discount. In addition to the saving to the home owner there is a major advantage to him in the combination of his obligation in one mortgage amortized at a reasonable rate. Many a home owner has been forced to sell because he could not meet the capital obligation of a second or third mortgage maturing in one, two or three years after he acquired his home.

MUCH is expected from the Mortgage Associations which the Act authorizes. These Associations, to be of not less than five million dollars capital privately subscribed, are practically Banks of Discount, having the right to buy mortgages on any type of property and to issue their bonds against insured mortgages up to ten times their capital. It will not prove the easiest thing to secure the stock subscriptions required for starting these Associations. The question naturally arises as to whether, with their bond issuing power limited to the insured residential mortgage of low interest yield, they can sell their bonds, unguaranteed by government as they are, at a sufficiently low interest return to provide an adequate differential for profitable operation. On the other hand, the fact that the law may, and probably will, be amended as experience shows expedient, and the Federal Charters thus may come to have great value, perhaps will furnish a powerful incentive. It is also possible that other Federal agencies, as the Reconstruction Finance Corporation, may be induced to furnish a goodly portion of the capital, taking preferred stock at a low dividend return, so that the common stock will be more attractive. The presentation of such a picture to investment bankers, manufacturers of building supplies, to communities, well might lead to the formation of a number of Mortgage Associations.

THE principal business of the majority of architects never has lain in small home designing and it may be asked what specific benefit will accrue even if residential work is stimulated by making more fluid the flow of mortgage money in this field. In the first place, the energetic publicity campaign now going forward through the Housing Administration, pointing the desirability of home ownership and the advantages of keeping all types of buildings in good condition because of the solidity of real estate as an investment, cannot fail to have its results throughout the whole field. Next, in the matter of mortgage money for other than homes, a sympathetic reaction already is apparent, and many

of the large agencies have announced willingness to recommence making mortgage loans on income projects demonstrated to be economically necessary and sound. Again, the resumption of activity in home construction will create wants for new building in many other directions. Finally, while it is regrettable that the Administration could not see its way clear to throw the weight of Government freely and fearlessly behind the whole mortgage structure, commercial and home, yet the Housing Act is epochal in character, and now that this long step has been taken to strengthen the mortgage structure based on the political appeal of help to the home owner, there is every reason to hope that there can be secured the changes and additions necessary to make thoroughly comprehensive, present Federal legislation dealing with the mortgage.

The amendments suggested are these:

(1) Modify membership requirements in the Home Loan Bank, so that every reputable and financially sound agency engaged in the business of making first mortgages on real estate can become a member without undue expense. The primary function of this bank is to lend money to members at low rates on the security of home mortgages they own.

(2) Perfect the Insurance Clause in Title Two of the Housing Act so that in case of default upon an insured mortgage the lender is made whole beyond peradventure. The present provision is that the lender receive, in the amount of principal due, a debenture of the Insurance Corporation, taxable, bearing not to exceed three per cent interest, and due three years after the original maturity date of the mortgage. The lender loses interest not paid and must bear foreclosure costs. The United States guarantees principal and interest on those debentures only, given for defaulted mortgages made prior to January 1, 1937. This is not cash insurance or its equivalent: it should be, if the borrower is to get the most advantageous interest rate, and if insured mortgages are to find ready sale. There is also a defect in the clause governing the cost of insurance, in basing the fee charged on the original face of the mortgage throughout the life of the insurance; it readily can be seen that the charge becomes disproportionately heavy as the mortgage is paid down.

(3) Abandon the Home Owners Loan Corporation at the first possible moment. Government has no business in the field of direct lending, except as a matter of dire emergency. Rather it should encourage lending through the usual channels and by constructive action designed to liquefy the mortgage, make it possible for the ordinary agencies to function under all conditions. The next section discusses possible means to this end.

(4) Eliminate the restriction that the Mortgage Associations can issue bonds only against insured mortgages, and provide both for government financing of these Associations and guarantee of their bonds. They thus would become true Banks of Discount for the whole long term credit structure. By standing ready to purchase sound loans from originating sources, they would liquefy the mortgage and in periods of stress prevent the frozen condition of long term credit which was one of the principal contributing causes of collapse. It is not always realized that long term credit is of greater magnitude than short term, a fact providing sound argument why government should take at least equal cognizance of the mortgage structure as it does of the banking. Thus far, however, it has been unwilling to place the weight of Federal credit fairly behind the mortgage structure.

As an alternate to the plan just proposed, a new Federal Corporation could be created, whose function it would be to act as a Discount Bank for other than home mortgages. Successful functioning of such a Bank is dependent on ability to sell its bonds at a low return yield, at least one per cent less than current interest rates on mortgages. The Bank therefore would require substantial capital, probably about a billion dollars, so that its bonds would have ready market at low rates. By this means the liability of government would be limited. When it is realized that three billion dollars has been authorized for the Home Owners Loan Corporation, the amount mentioned does not seem undue, especially in view of the fact that one such corporation could handle the whole mortgage situation in a complete and satisfactory manner. The very existence of the Discount Bank would bring money back into mortgages since they immediately would cease to be frozen credits. It further is to be pointed out that this desirable situation is possible of only partial attainment under legislation as it now exists; a purchaser still must be found for an insured mortgage, and there is no certain place to go to sell a mortgage in case of need.

EVENTS only can determine just what effect the Housing Act will have upon the mortgage structure of this country. That effect may well be far reaching, especially in view of the fact that men of business competence and energy have been secured to guide its destinies. Modifications along the lines set forth seem eminently desirable. The exact relationship of Government to the mortgage business must be definitized promptly, and permanent policies adopted comprehending the whole field. Not a great deal remains to be done, and the result once accomplished, confidence will be restored to lenders, and mortgage money for needed improvements again will flow in volume.

It is recognized that we are one of the worst housed of civilized nations, so far as the modest income group is concerned. There is great need for major rebuilding of sections of our cities, or the development of satellite towns to replace outmoded districts. During a long period no commercial or apartment building has gone forward; yet in these years obsolesence has been at work and the need for bettered facilities is becoming apparent. More is needed than restoration of mortgage credit to start movement in new construction. It is remarkable, however, when a little betterment of general conditions comes, how quickly what seems a surplus is absorbed, and shortage appears, a situation which means the creation of new facilities. Activity induced by the Housing Act can go far towards arousing consciousness of the fact that we are on the threshold of an expansion era for real estate improvement.

COLUMBIA ADOPTS NEW SYSTEM OF TEACHING ARCHITECTURE

Abandoning teaching methods employed for more than forty years, the School of Architecture of Columbia University has reorganized the study of design to embrace a three-year program of personal tutoring of each student by a master, according to an announcement by Dean Joseph Hudnut. The major change involves individual guidance for each student by a master. Group competitions are eliminated. The problem method, developed at the Ecole des Beaux Arts in Paris, will be retained as the basic principle of instruction.

"At the Ecole the problems are given in the form of competitions," Dean Hudnut explained. "Competitions of this character have been held at Columbia for many years. We shall now continue the problem method, but abandon the competitions. Our reason for doing this is to be found in the fact that the competitive process has developed so many conventions and so many arbitrary standards of judgment as to become almost completely divorced from reality, and it is felt that these deficiencies could not be corrected except by the substitution of some new technique.

"The most important aim at Columbia is to develop a system of teaching which will be highly realistic in character. We wish to do away so far as is possible with the artifices and conventions of our teaching and to encourage in our schools the methods, the habits of thought, and even the atmosphere which obtains in the office of a practicing architect.

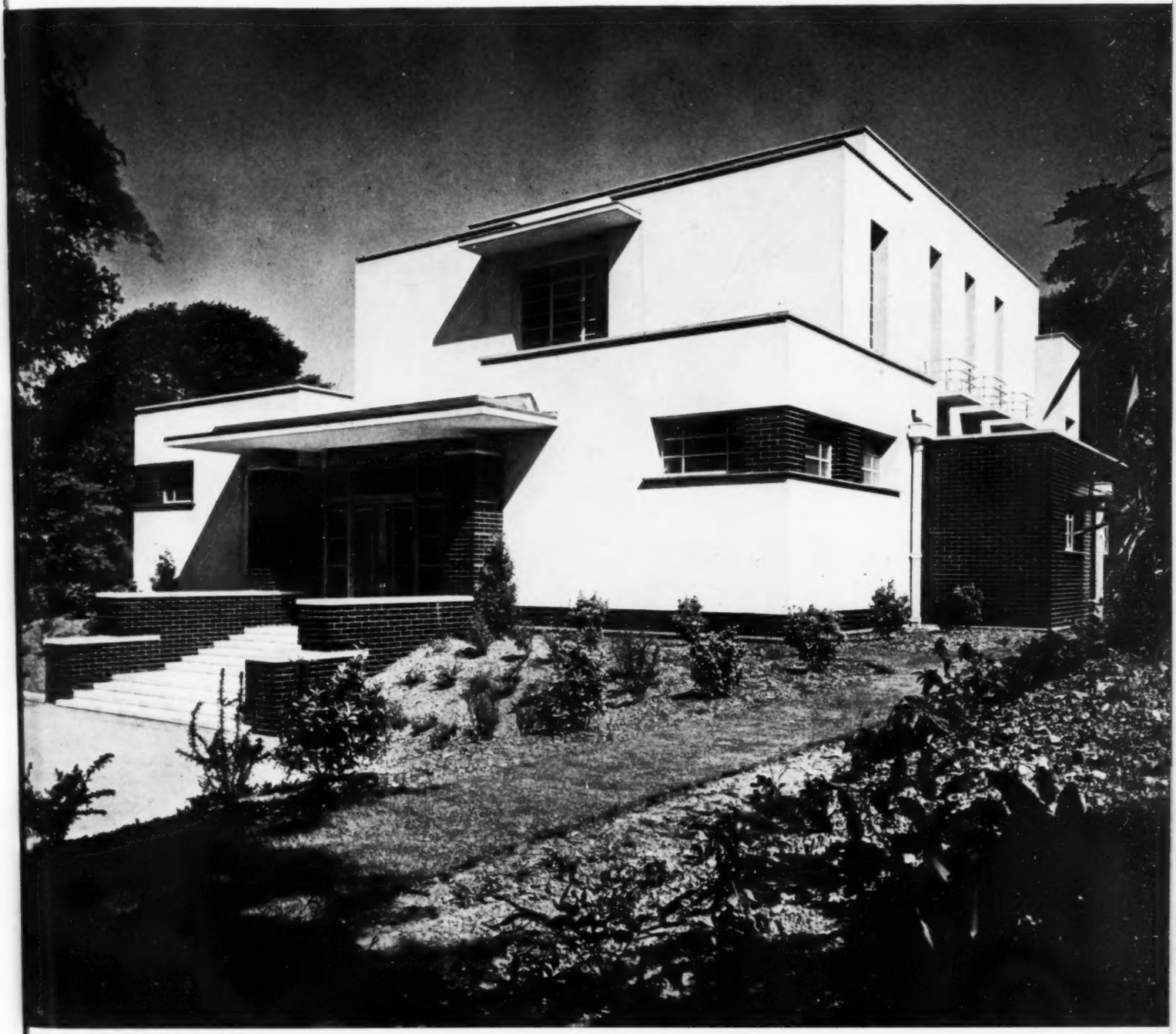
"For this reason we shall substitute an individual method of teaching for the group competitions. Each student will work on his own design under the direct guidance of a master, and his performance will be judged by the master as an individual exercise in no way related to the work of other students."

The new system, it was pointed out, eliminates the juries of professional architects formerly called upon to judge the finished drawings of the students. The juries saw only the "presentation" drawings, and were not acquainted with research and preliminary drawings upon which they were based.

Three studios have been equipped in the School of Architecture where design work will be carried on in the future. In order to secure a more direct and personal contact between teacher and student, the students will be divided not into classes but into studio groups, each group comprising both beginners and advanced students. Each of these groups, which will be limited to about twenty-five students, will be placed in charge of a master who will guide them in such a way that they may be successful by their own efforts in developing designs.

Jan Ruhtenberg, Swedish architect and designer of apartments and country homes in "modern style," will be the master of one studio. His assistant will be William T. Priestley. Dean Hudnut and Russell M. Krob will be the masters of the other two studios. Pierre A. Bezy will assist Mr. Krob. Walter B. Sanders will assist Dean Hudnut. Henry S. Churchill and Frederick Woodbridge, Jr., will be the masters of the evening studios, in which students of University Extension, not candidates for a degree, will pursue the design course under the new plan. Prof. Harold V. Walsh and William F. Drewry, Jr., were named construction critics to assist the masters of each studio.

Dean Hudnut declared that the new system has a certain resemblance to the master school system of the German technical high schools "where the relation of master and student is direct and intimate and where the emphasis is upon the technical development of the student rather than upon graphic presentations."



Photographs by Dell and Wainwright

SIR JOHN BURNET, TAIT & LORNE, AND D. G. ARMSTRONG, ARCHITECTS

Howard Hall—the Temple of St. Mary Lodge—situated in the Causeway, Bocking, on the outskirts of Braintree in Essex, England. The site was a garden originally forming part of the grounds of a large house which was demolished several years ago. To obtain the requisite accommodation with the funds available a severely simple design was adopted, color and massing being relied on for effect. Owing to the necessity of providing sufficient parking space and to suit the nature of the garden, it was decided to place the dining hall immediately above the Temple.

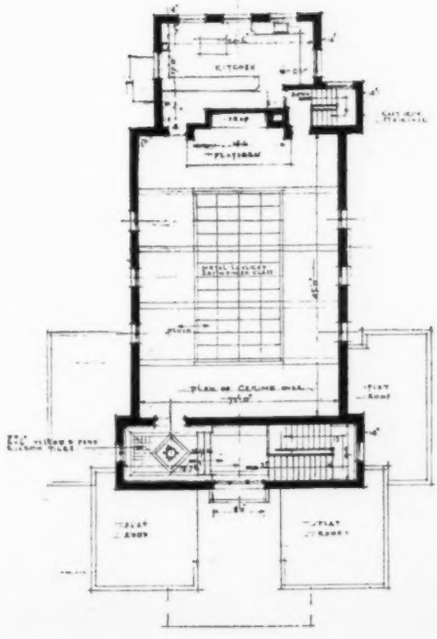
The building is of normal construction with the general elevations finished in pale cream Cullamix and a plinth and piers of mottled black glazed brick. Parapets throughout are of 2" blue York stone with a recessed course of sky blue tile below. The side and rear elevations have a base of yellow Kent stock facings and azure blue tile to the faces of the dwarf piers between the Temple windows. All brick facings are finished with a flush vertical joint and raked out horizontal joints. Crittall metal windows have been used throughout, well recessed from the outer face of the walls and with 1" slate sills, set to a very slight weather.

A MASONIC HALL IN ENGLAND

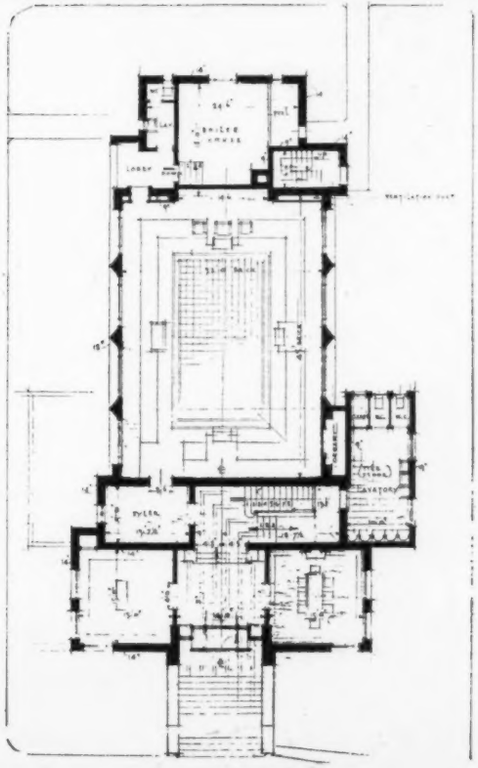
Photographs by Dell and Wainwright

HOWARD HALL
THE CAUSEWAY
BOCKING, BRAINTREE,
ENGLAND

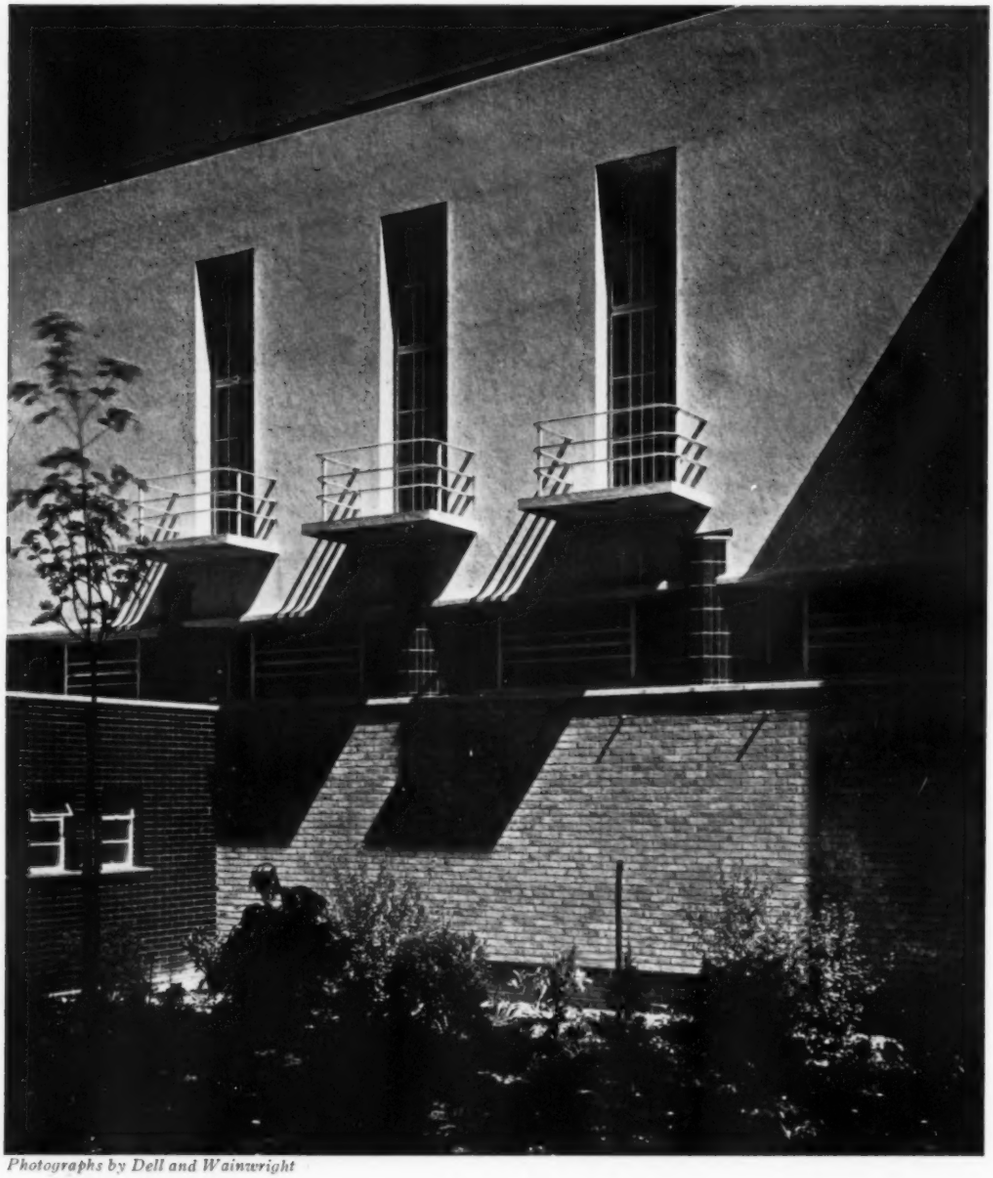
SIR JOHN BURNET,
TAIT AND LORNE,
AND D. G. ARMSTRONG
ARCHITECTS



FIRST FLOOR PLAN



GROUND FLOOR PLAN



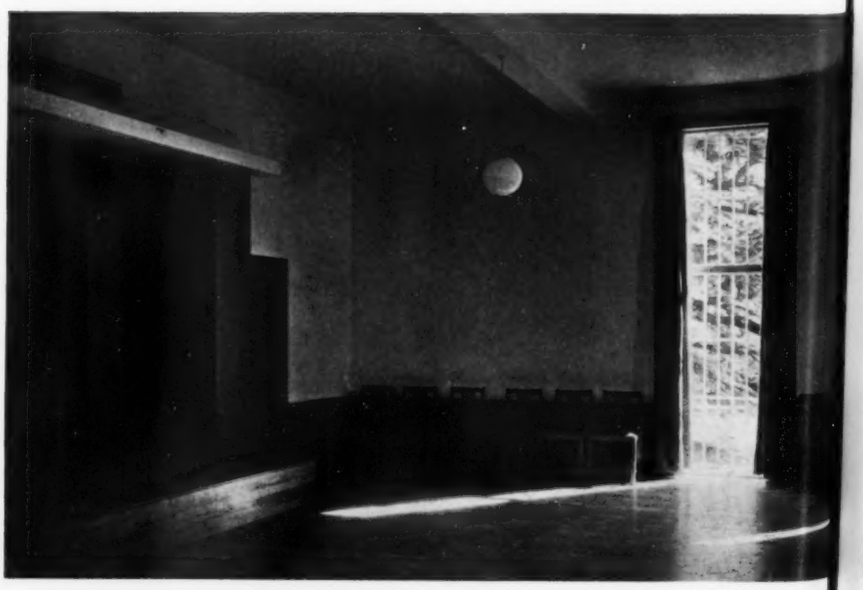
Photographs by Dell and Wainwright

TEMPLE OF ST. MARY LODGE AT BOCKING, BRAINTREE, ENGLAND

(Right)

The Temple has been designed on simple lines to form a background for Masonic ritual; it seats about 120 persons on raised oak platforms arranged on the four sides. Windows high up on the two long sides give natural lighting for the few periods when the room is used during the day. From floor to window sills the walls have a flush oak finish with horizontal bands of silver bronze. Macassar ebony has been used for the recessed skirtings, jambs of doors and to the truncated piers at each side of the recess behind the Master's chair. Lighting of the Temple is by concealed strip lights arranged in continuous runs on each side of the main beams supporting the floor above and on each of the two short walls. The lights reflect from the ceiling and can be dimmed or made brilliant according to the nature of the Masonic function. At the rear on the ground floor is arranged the boiler house equipped with a fully automatic oil fuel-fired boiler which provides for heating and hot water, and storage for lodge furniture.

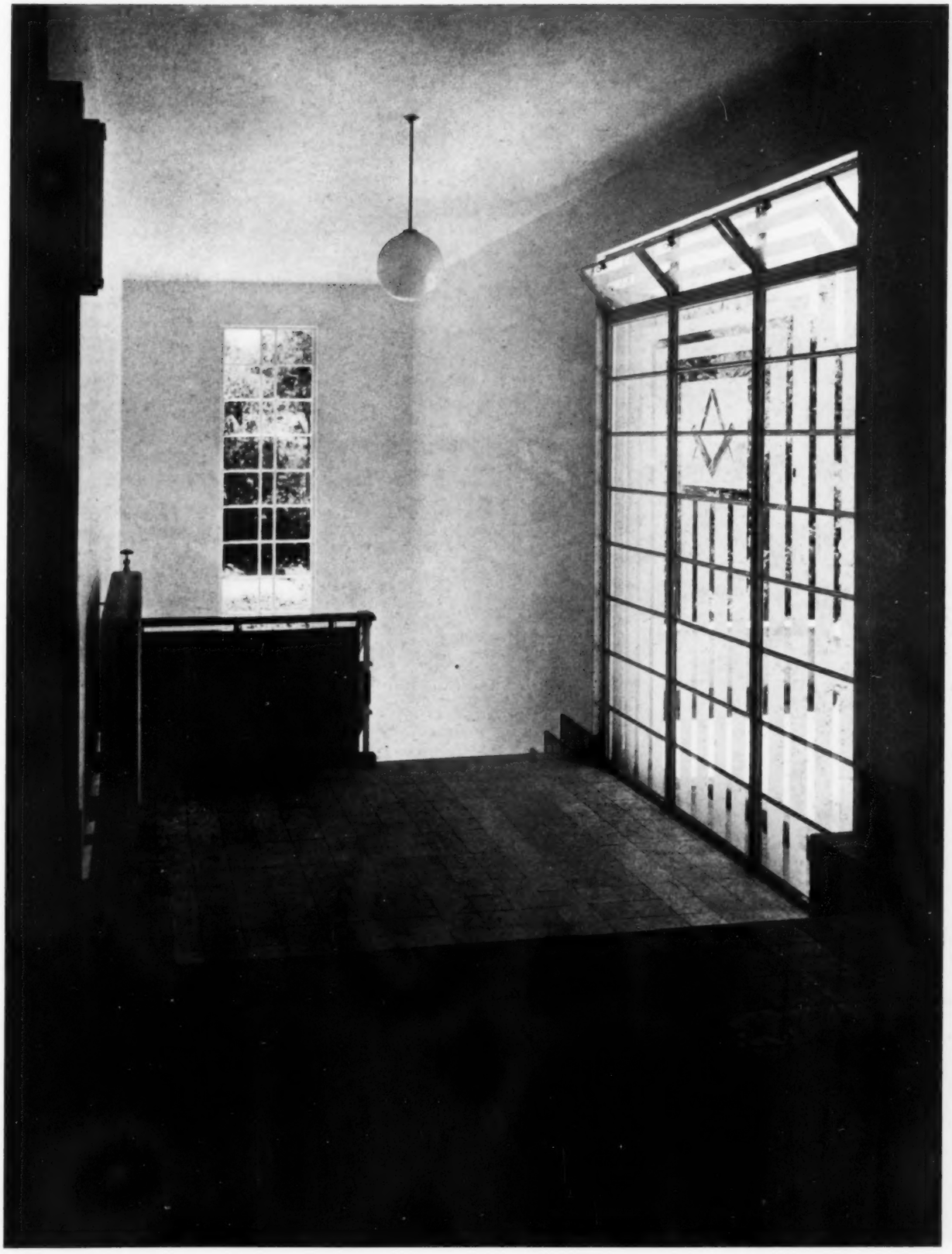
On the first floor is the dining hall, seating 120 persons, and the kitchen. The dining hall has an oak floor and dwarf flush oak dado, with flat enameled walls in pale buff above. A small stage at the kitchen end is finished in oak and has a trap door in the floor giving access to a table and chair storage arranged on a mezzanine floor below. At each side of the dining hall are three narrow windows running the full height of the room and with doors in the lower portions opening on to small balconies.



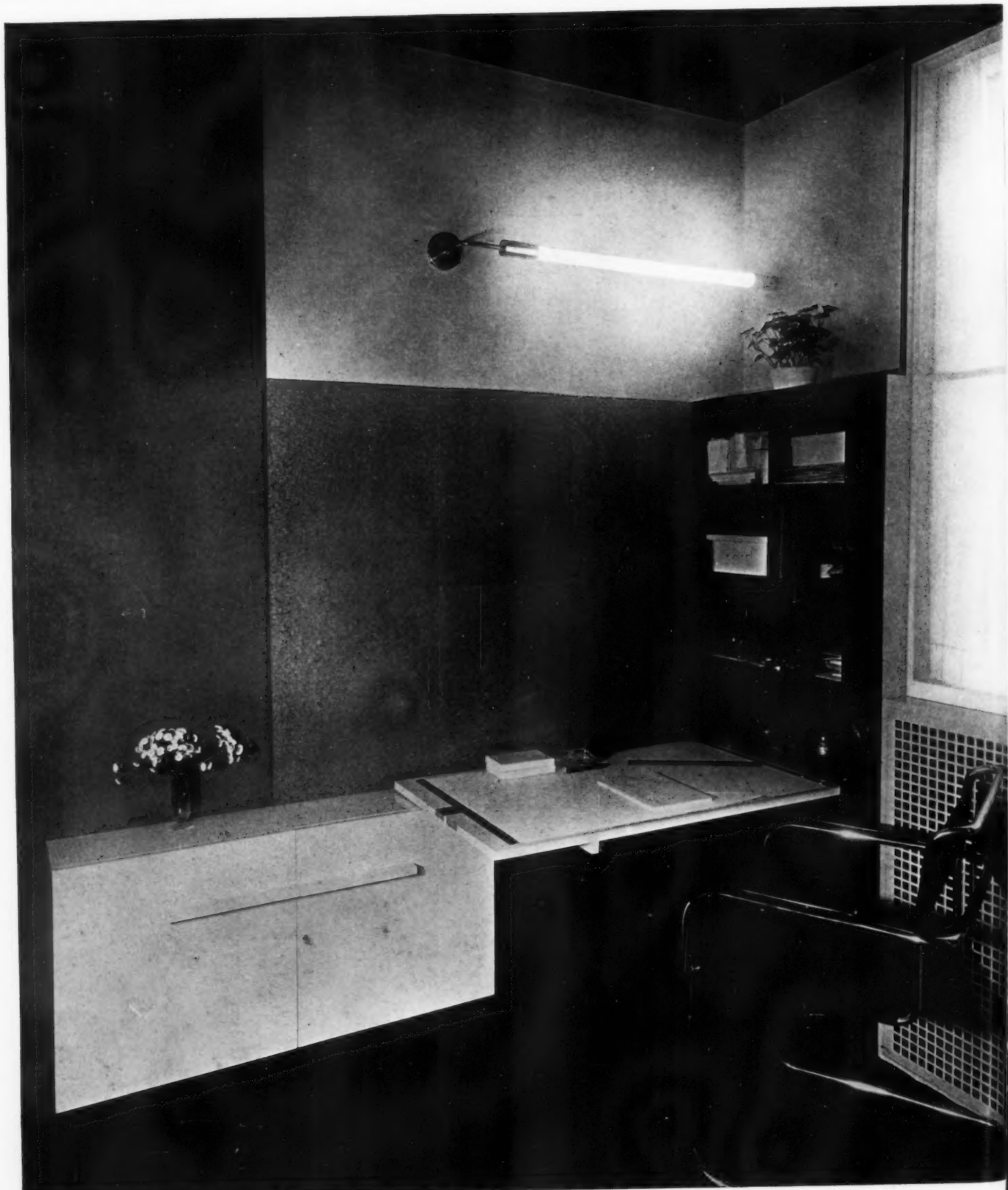
SIR JOHN BURNET, TAIT & LORNE, AND D. G. ARMSTRONG, ARCHITECTS

Photographs by Dell and Wainwright

TEMPLE OF ST. MARY LODGE AT BOCKING, BRAINTREE, ENGLAND
SIR JOHN BURNET, TAIT & LORNE, AND D. G. ARMSTRONG, ARCHITECTS



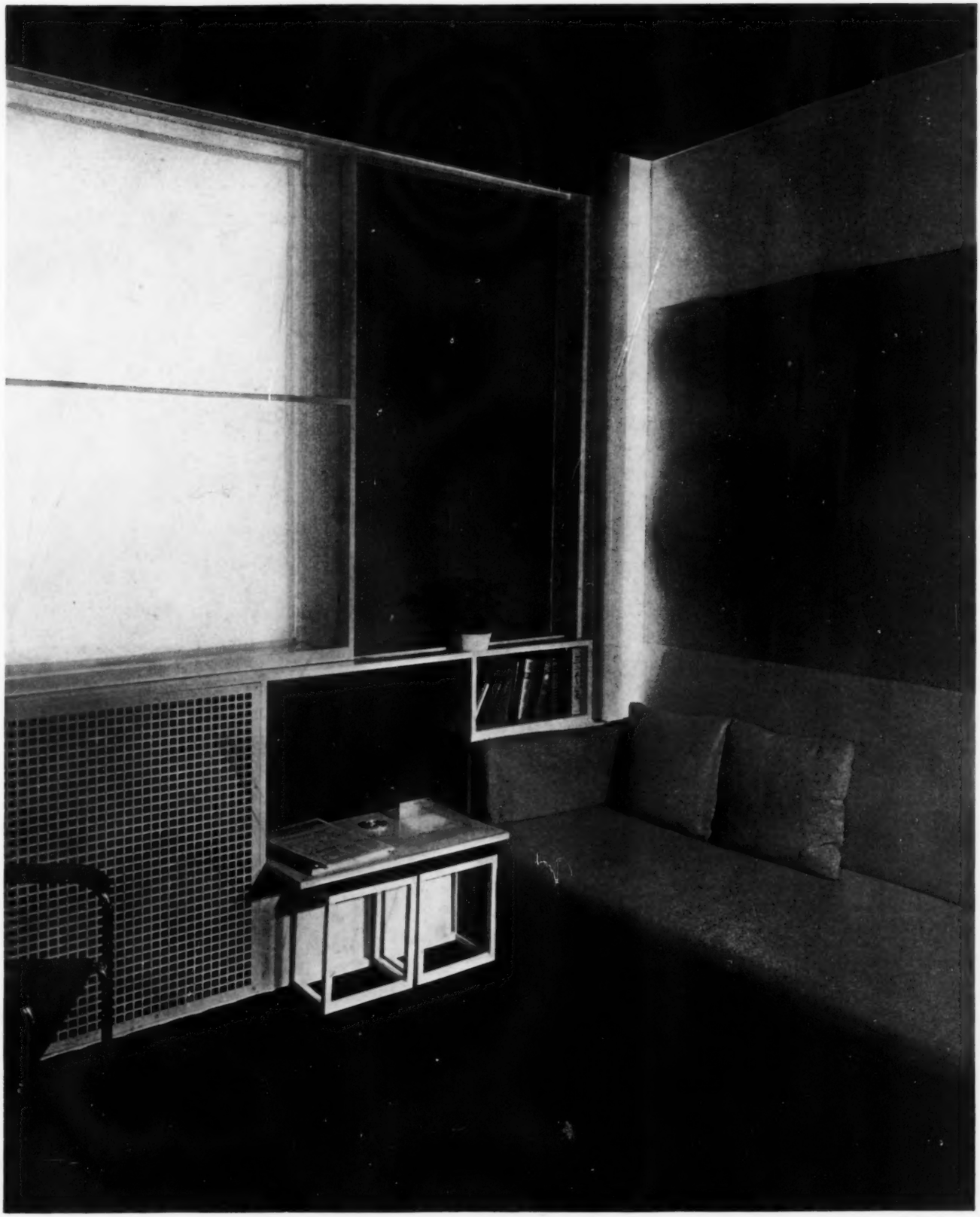
The crush hall and staircase and landing have plastered walls, flat enameled in a pale buff, skirtings of black glazed tile, and floors and treads and risers to stairs of gray and buff tile.



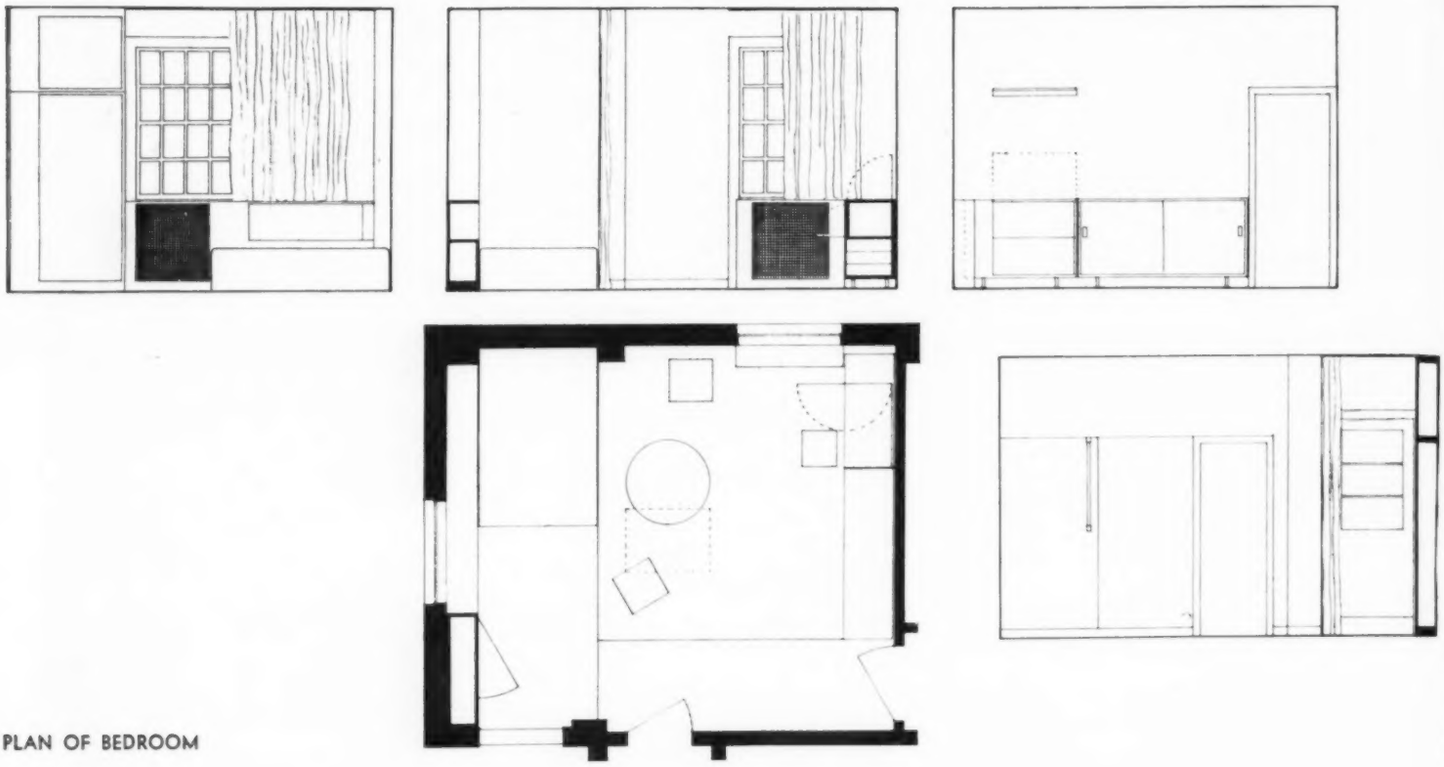
Photographs courtesy of ARTS AND DECORATION

WILLIAM MUSCHENHEIM, ARCHITECT

328 A PENTHOUSE APARTMENT IN NEW YORK CITY



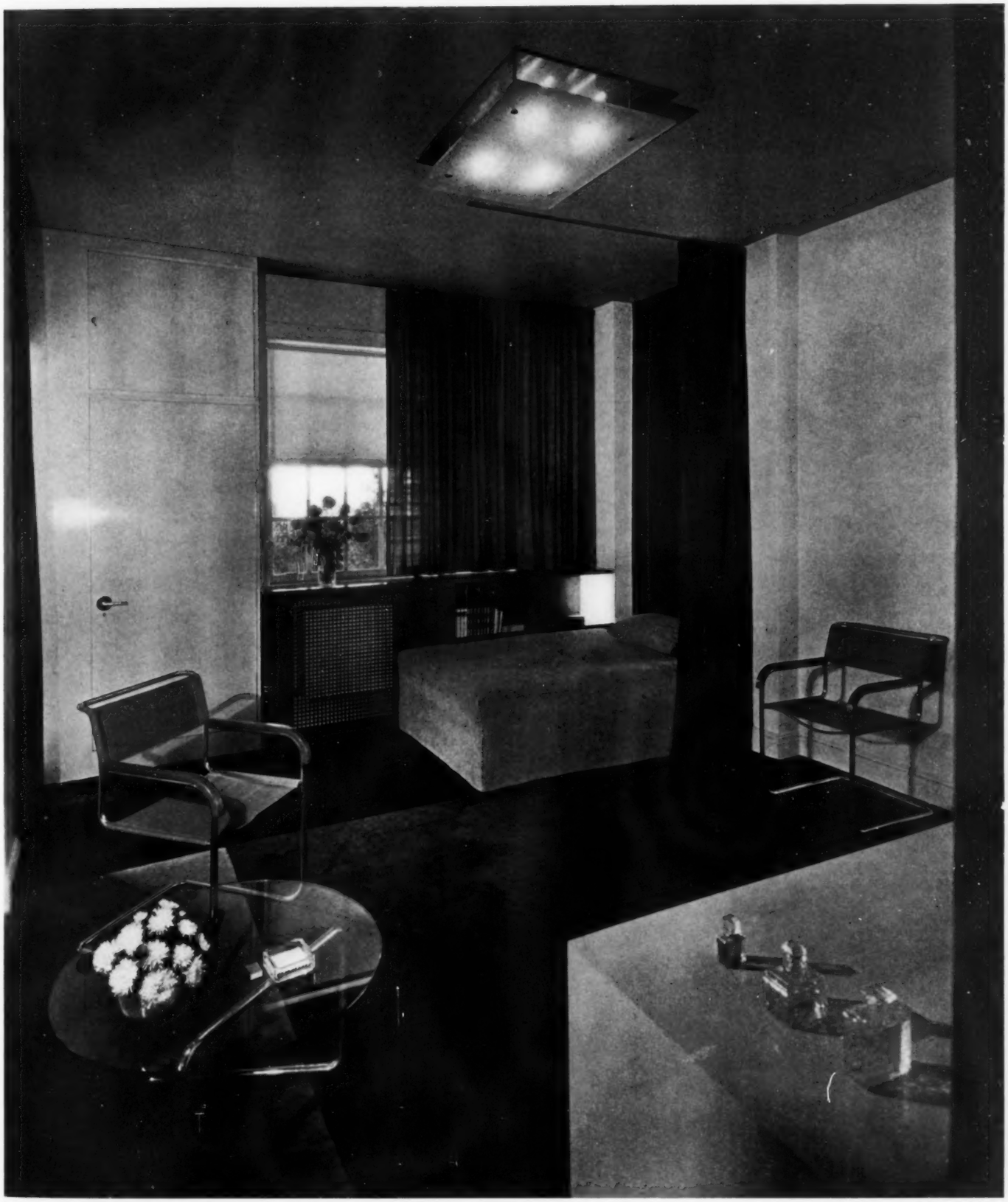
In this apartment of Mr. and Mrs. Immo Gulden the library has been designed to include a number of activities in a floor space measuring not more than 9 square feet. The desk folds up off the hanging chest when not in use. The cork covered wall serves as a convenient place to tack up notes and memoranda. The ceiling and carpet are black. The panel to the right of the window is blue and the built-in couch is a pale yellow.



PLAN OF BEDROOM

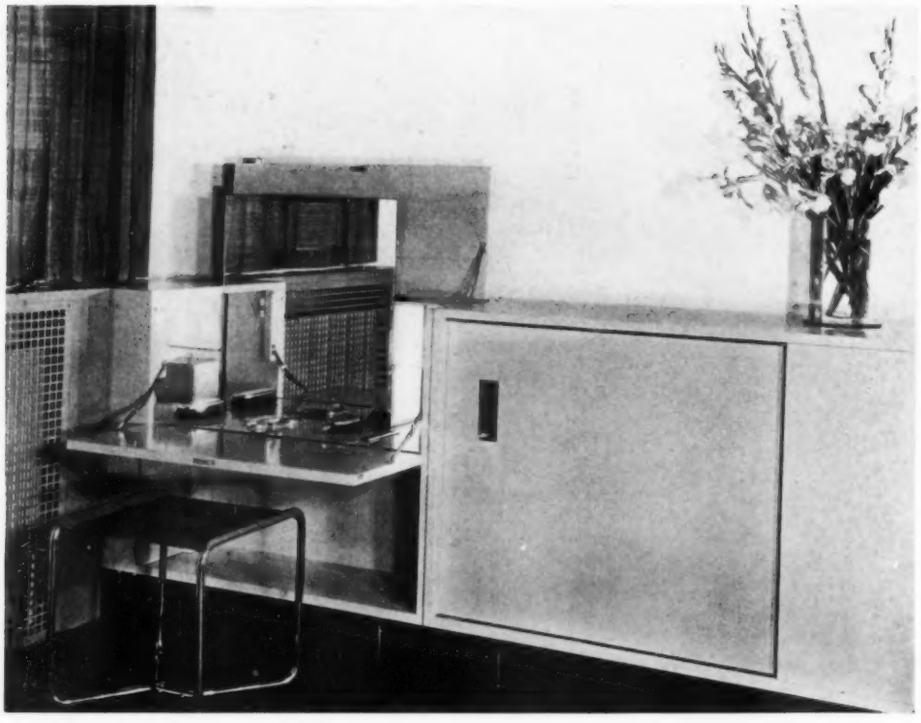
APARTMENT OF MR. AND MRS. IMMO GULDEN IN NEW YORK CITY
WILLIAM MUSCHENHEIM, ARCHITECT

330 PLAN OF STUDY



Photograph by F. S. Lincoln

The color scheme in the bedroom is gray, blue, and orange. The carpet has a blue center, a gray strip running before the mirror wall on the left, a black strip from the door under the bed. The bed covering is an imported orange chenille. The radiator box is blue. The blue burlap used for the bed curtains also makes a panel above the bed. Window curtains are gray silk.



Photographs courtesy of ARTS AND DECORATION

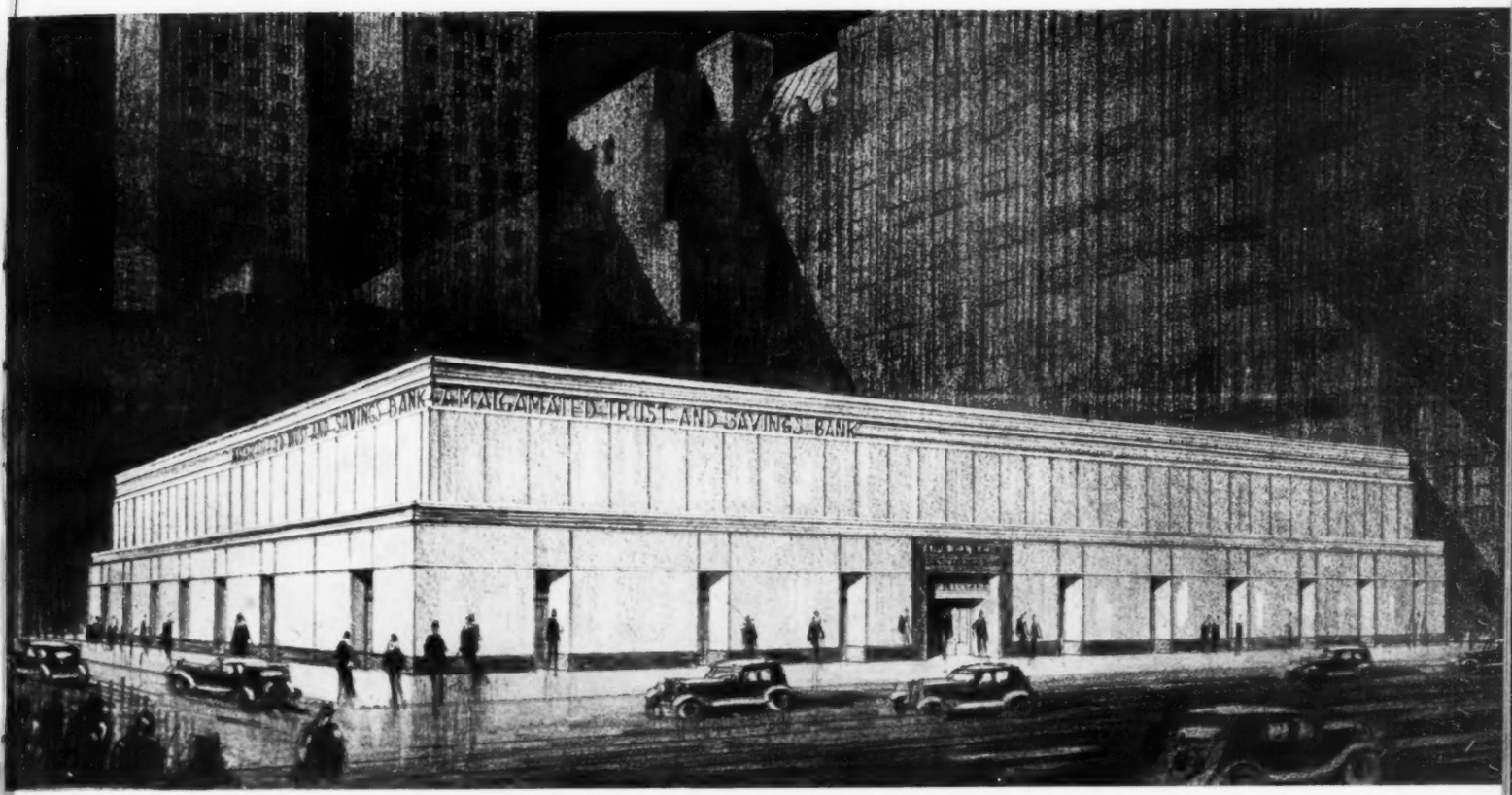
Above:

The combination dressing table and clothes chest is made of white holly and extends the width of one end of the bedroom. The wall is white, the radiator cover orange. The chromium stool has gray canvas seating.

Right:

Entrance hall to apartment.

NEW YORK CITY APARTMENT
OF MR. AND MRS. IMMO GULDEN
WILLIAM MUSCHENHEIM, ARCHITECT



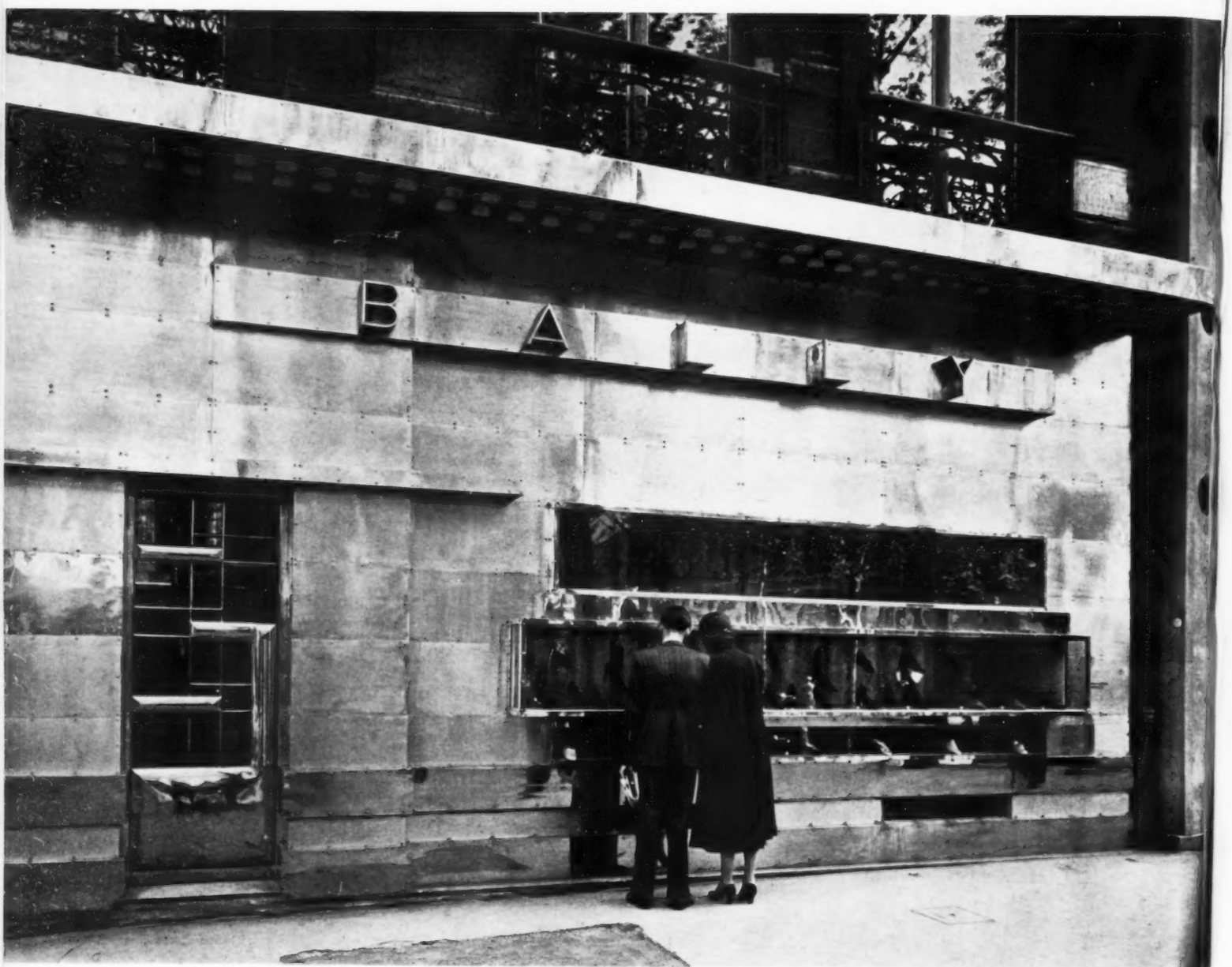
AMALGAMATED TRUST & SAVINGS BANK BUILDING
CHICAGO . . . HOLABIRD & ROOT, ARCHITECTS

This "taxpayer" is to replace the old 7-story Guardian Bank Building and 11-story Adams Express Building on the southeast corner of Monroe and Dearborn Streets, located in the heart of Chicago's business Loop.

The new building is to have two stories and basement for shops, offices, and the bank. It will front 131½ feet on Monroe Street, 190 feet on Dearborn Street, and will cost from $275,000 to $350,000, depending on requirements of tenants with whom negotiations are pending. At present rentals the building will pay operating expenses, taxes and upkeep, together with amortization, over ten or twelve years.

The first story completely covers the property. The second story is set back from the street line approximately 5 feet and is 65 feet deep in both wings. The first story is 13½ feet in the clear, the second generally 12 feet with a portion 15 feet clear.

The materials are glass and stainless steel. The building is to be air conditioned with individual control, the windows being completely sealed with the heads on a line with the ceilings. Construction was begun September 10, this year. The building will be completed February 28, 1935.



Photographs by F. S. Lincoln

MALLET-STEVENS, ARCHITECT

334 A SHOE SHOP IN PARIS

F. S. Lincoln

A SIGNAL TOWER IN FRANCE

awing photographed by Louis H. Dreyer

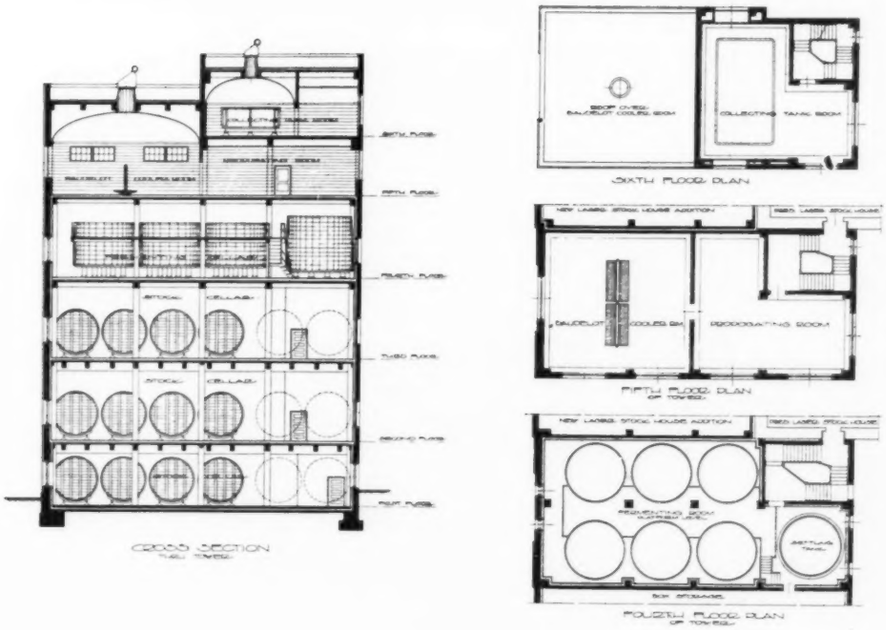
G. KRUEGER BREWING CO. LAGER STOCK HOUSE ADDITION
NEWARK, N. J. . . . WALDEMAR MORTENSEN, ARCHITECT

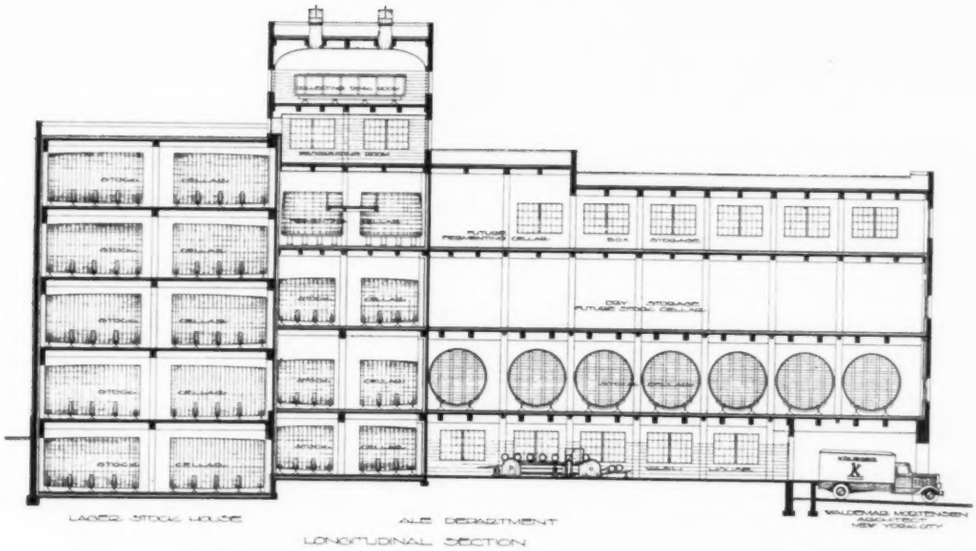
To increase manufacturing capacity, the G. Krueger Brewing Co. decided to build a lager storage building adjacent to the stock house in which their product had been produced for many years, and also to extend this building as a complete ale production unit to facilitate the fermenting, aging and packaging of ales, stouts and porters.

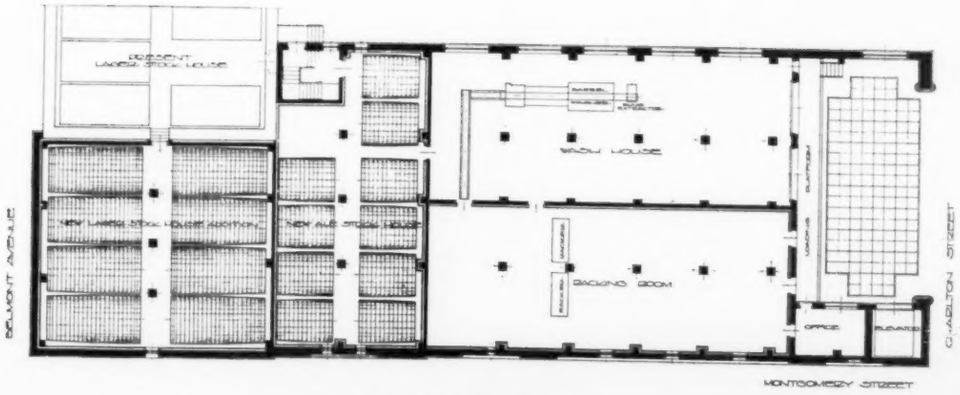
The lager storage building is 55 x 51 feet and 5 stories high. The ale unit consists of a building 146 x 71 feet, part of which is 6 stories high and part 4 stories.

The hot wort from the hop jack in the present brewhouse is pumped to the copper collecting tank on the sixth floor and after standing for a proper interval is allowed to flow by gravity over the wort cooler located on the fifth floor. The cooled wort runs to the settling tank located in the fermenting room on the fourth floor. After requisite settling period the wort is pumped to the vertical fermenting tanks where it is fermented. From the fermenters the ale or stout or porter is allowed to flow to the storage tank assigned to it where it remains during the aging period. When the product is ready for shipping, it is piped to the racking room located on the ground floor where it is racked into the various packages for distribution. The wash room for the returned kegs is located on the ground floor beside the racking room. The delivery platform is recessed into the building to give protection from the weather and to prevent blocking of the sidewalk by the trucks.

The building is of steel skeleton construction, with brick walls independent of the steel, allowing the insulation to be applied to inside of brick walls in an unbroken envelope of insulation. Interior walls are plastered and painted white. The floors are of mastic finish. The walls of the propagating room, collecting tank room, and Baudelot cooler room and wash house are finished with a buff colored terra cotta. The cellars are cooled by coil type air conditioners, hung from the ceiling in the lager cellars and standing on the floor in the ale cellars and fermenting rooms.

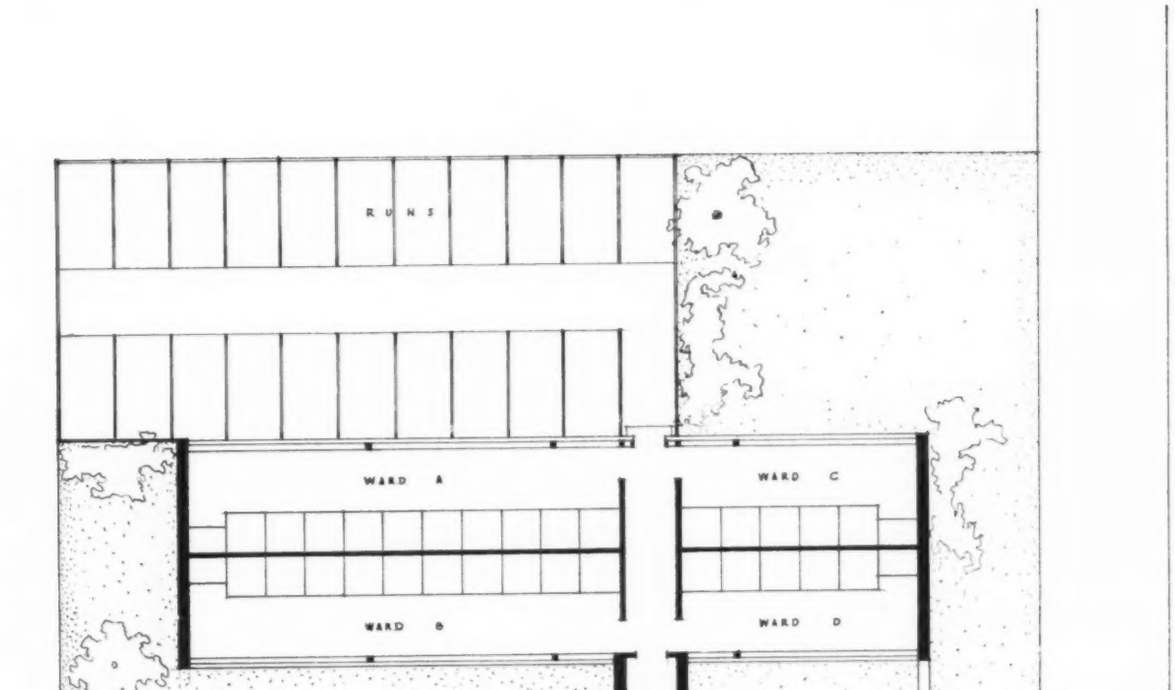

SIXTH FLOOR PLAN
FIFTH FLOOR PLAN
OF TOWER
FOURTH FLOOR PLAN
OF TOWER
CROSS SECTION


LAGER STOCK HOUSE
ALE DEPARTMENT
LONGITUDINAL SECTION

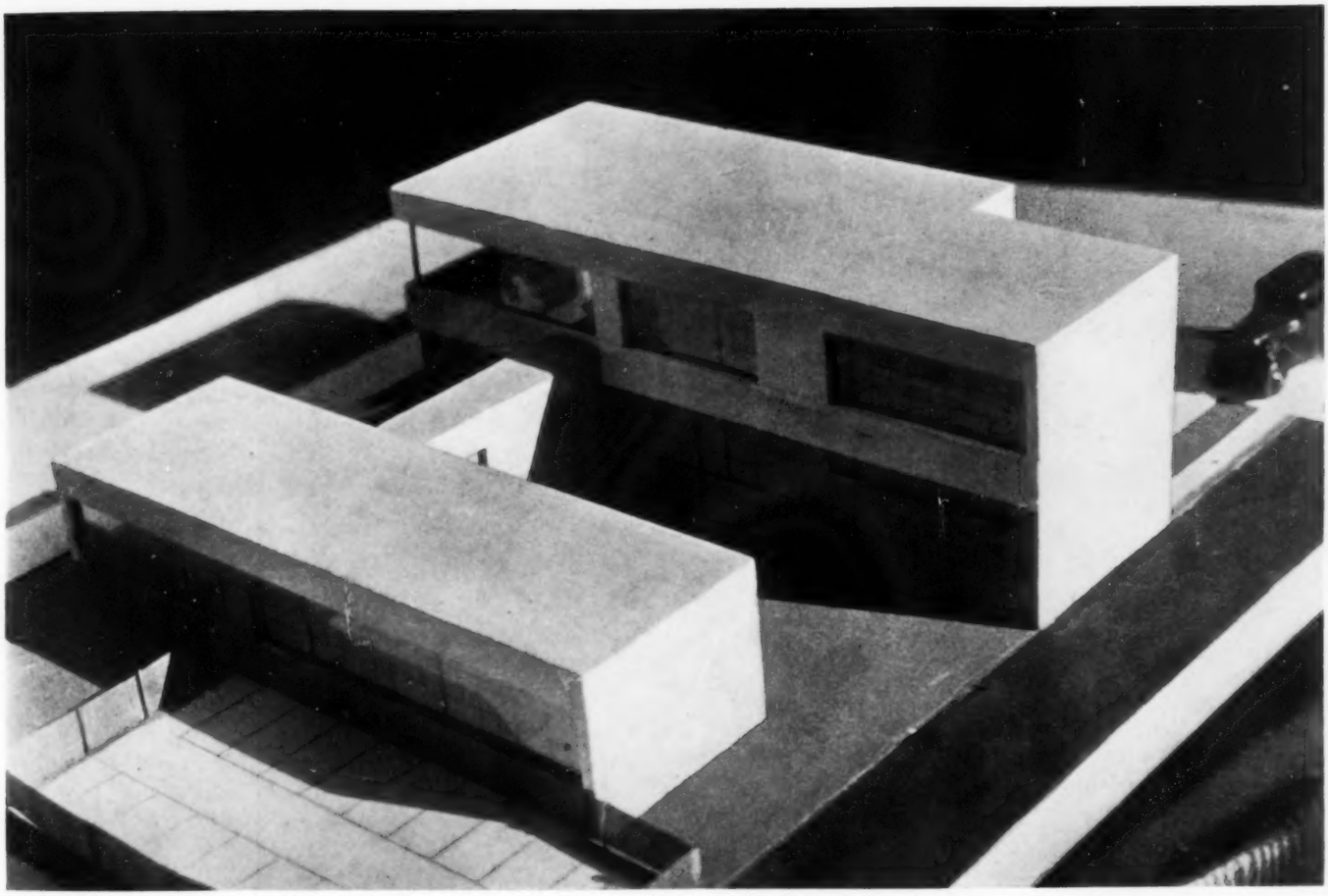

BELMONT AVENUE
MONTGOMERY STREET
CHARLTON STREET
WASH HOUSE
BACKING ROOM
OFFICE
ELEVATED
FIRST FLOOR PLAN

A VETERINARY HOSPITAL FOR LONG ISLAND CITY, N. Y.

NORMAN N. RICE, ARCHITECT



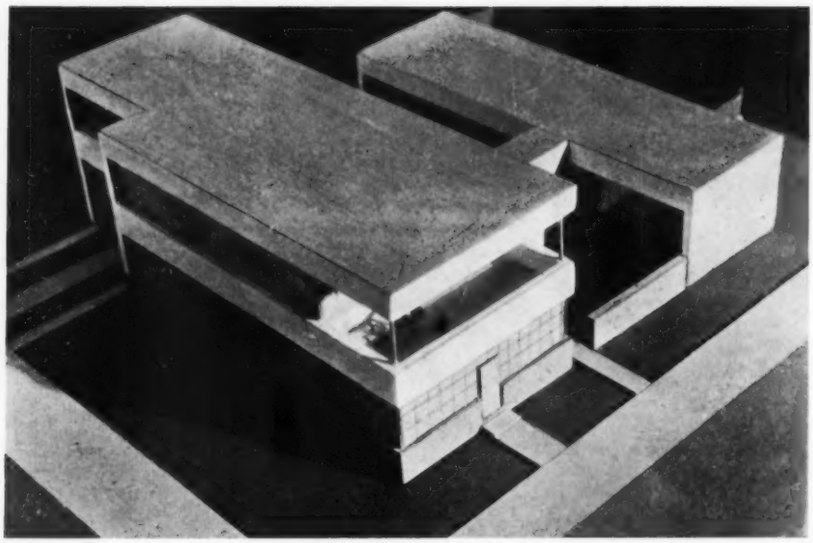
FIRST



REQUIREMENTS FOR VETERINARY HOSPITAL

In general, the problem of the veterinary hospital is similar to that of the human hospital. The differences are results of the size, characteristics and treatment of patients. The building illustrated is designed for the hospitalization of dogs and cats and an occasional bird or monkey. As in all hospitals, abundance of sunlight and air, sanitary surfaces, segregation of diseases, quiet, convenience and efficiency of equipment and layout are desirable features. From the financial point of view, the small veterinary hospital is similar to a private hospital. It is an income-producing building in which the doctor's fees and hospital charges must show a reasonable return over and above carrying charges and operating expenses. Unlike an apartment or office building, it is not possible to arrive at an expected gross income from rentals.

SECOND



VETERINARY HOSPITAL, LONG ISLAND CITY, N. Y. . . . NORMAN N. RICE, ARCHITECT

From previous experience, the veterinary was able to determine the minimum of essential rooms and furnishings which would allow him to work with utmost efficiency and convenience. The operating personnel includes the doctor, his assistant, a kennelman, and a reception clerk.

The layout can be divided roughly into in-patient and out-patient divisions, although practice in a small hospital means a constant overlapping of the two.

The OUT-PATIENT GROUP includes the reception, pharmacy and two examination rooms. In emergency cases, the dressing, X-ray and surgery rooms may be considered as out-patient. These are the rooms to which clients are admitted to hear the diagnoses, watch treatments, and receive instructions and drugs for further treatment of the animals.

(1) Reception room: seating for 10 clients; reception clerk's desk and chair.

(2) Examination rooms (diagnosis and minor treatments): 25 x 40 inch glass top table, small wall cabinet for instruments and dressings (top used as a writing shelf), lavatory, and chair.

(3) Pharmacy: cupboards and drawers for storage of drugs and dressings, sink, and small preparation table; for direct access, the examination rooms are placed on either side with communicating doors.

The IN-PATIENT GROUP includes the four wards, the outside runs, the dressing, X-ray, surgery, kitchen, work, and isolation rooms.

Owners are seldom admitted to these rooms; visiting the animals is discouraged, but when owners insist, the corridor connecting the ward and hospital wings may be used as a visiting room.

(1) Dressing room (treatment of in-patients, irrigation, treatments after X-ray diagnosis, surgical preparation, instrument sterilization, and also used as an extra examination room): two 25 x 40 inch glass top tables, irrigation stand, lavatory, instrument and dressing cabinet (in wall opening) with glass doors on both sides and sterilizer beneath.

(2) X-ray room: small dark room for a fluoroscope.

(3) Surgery (major treatments and operations): operating table, instrument tray, basin stand, lavatory, and access to instrument and dressings cabinet.

(4) Wards (Ward A, 20 cages for cats and maternity cases; Ward B, 20 cages for non-contagious diseases, surgical cases, and boarders; Ward C, 10 cages for skin diseases; Ward D, 10 cages for distemper cases): cages are in two superposed levels and face the windows to receive sunlight either in the morning or afternoon; an open closet in each ward for slop sink, cleaning equipment, refuse can, etc.; corridor between wards arranged to control the movement of animals to the outside runs while emptying one ward for general cleaning.

(5) Runs (segregation and control of animals while outdoors): compartments separated by wire fabric fences.

(6) Workroom (washing, clipping and plucking): two glass top tables with clipping machines hung overhead, large sink with double drain board, and cupboard.

(7) Kitchen (storage and preparation of food for in-patients): small range, refrigerator, table, cupboards and bins.

(8) Isolation room (special observation cases, rabies cases, destroying cabinet): four cages, and an airtight cabinet for destroying animals by lethal gas.

SERVICE ROOMS:

(1) Room and bath for the kennelman who is caretaker of the animals; the bathroom will be used by clients also.

(2) Garage for the ambulance and the doctor's personal car.

(3) Broom closet for cleaning equipment.

(4) Furnace room in basement for heating plant and small incinerator.

On the second floor are the doctor's apartment and his laboratory. The location of the stairs between these two units was essential in order to allow private access to the laboratory at all times. The laboratory will be used as a library and study as well as for research. The apartment includes living room, terrace, two bedrooms, kitchen and bath. A separate first floor entrance to the apartment was not considered necessary.

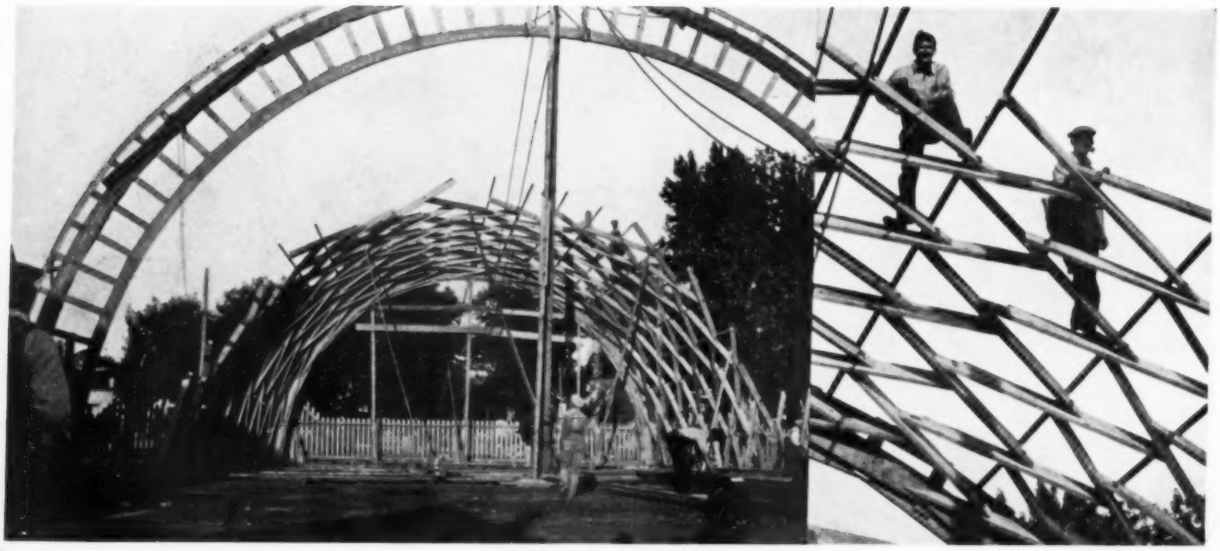
Photograph by Albert Frey

AUTO SERVICE STATION

The plan has a definite separation of gasoline sales and service. Space is given to sales of accessories, car laundry and repairs. The driveway is illuminated by overband flood lamps. There is localized illumination of pumps and car shelter.

AN AUTOMOBILE SERVICE STATION

A MUSIC SHELL IN MILWAUKEE



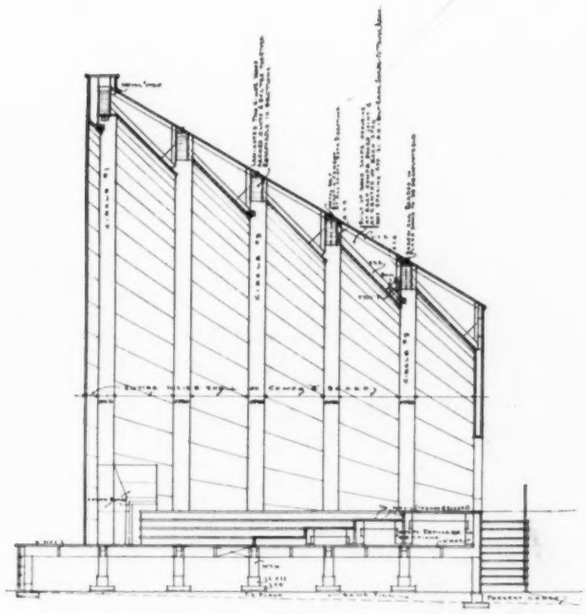
HUMBOLDT PARK MUSIC SHELL
MILWAUKEE . . . CLAS AND CLAS, ARCHITECTS

The general design is similar to the music shells in Hollywood and Chicago on a somewhat smaller scale and using different materials. The location is a natural crescent-shaped amphitheater with an easy rise to a crown several hundred feet away, allowing a seating capacity in excess of 30,000 persons. Approximately 100 musicians and 300 choristers can be seated in the shell. Total cost of project: $8,800.

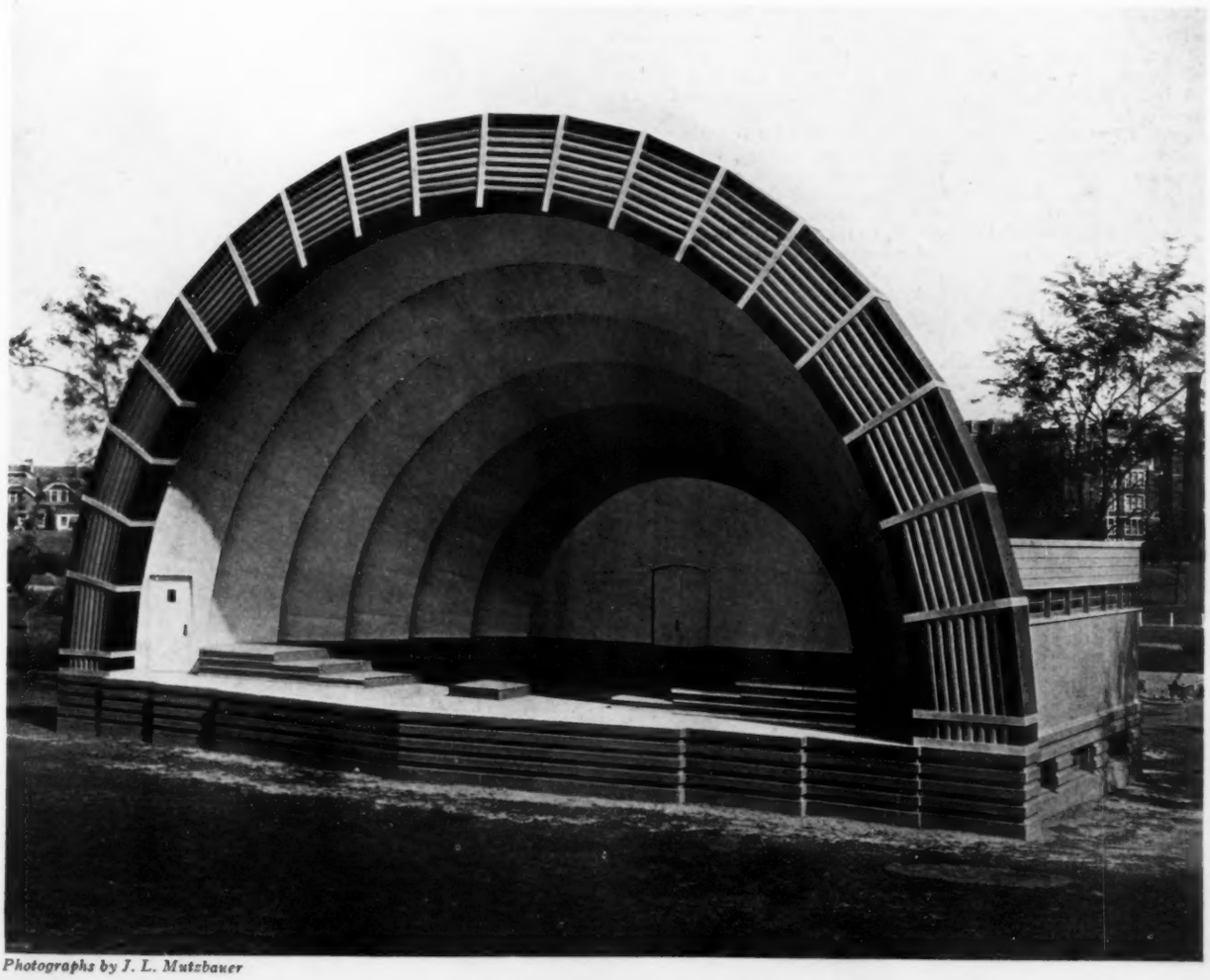
An interlocking arch roof construction is used in the wood frame superstructure. The deflector blades are furred out with reused form lumber with Masonite tempered Presdwood with sheet metal trimmings. The base is of reinforced concrete and has storage space for benches and general park equipment.

The shell interior has lighting in each trough formed by junction of the deflecting blades and not in alternate troughs as in the case of other music shells. No lighting was required in the amphitheater since the silvery reflecting surface of the shell casts the light several hundred feet forward.

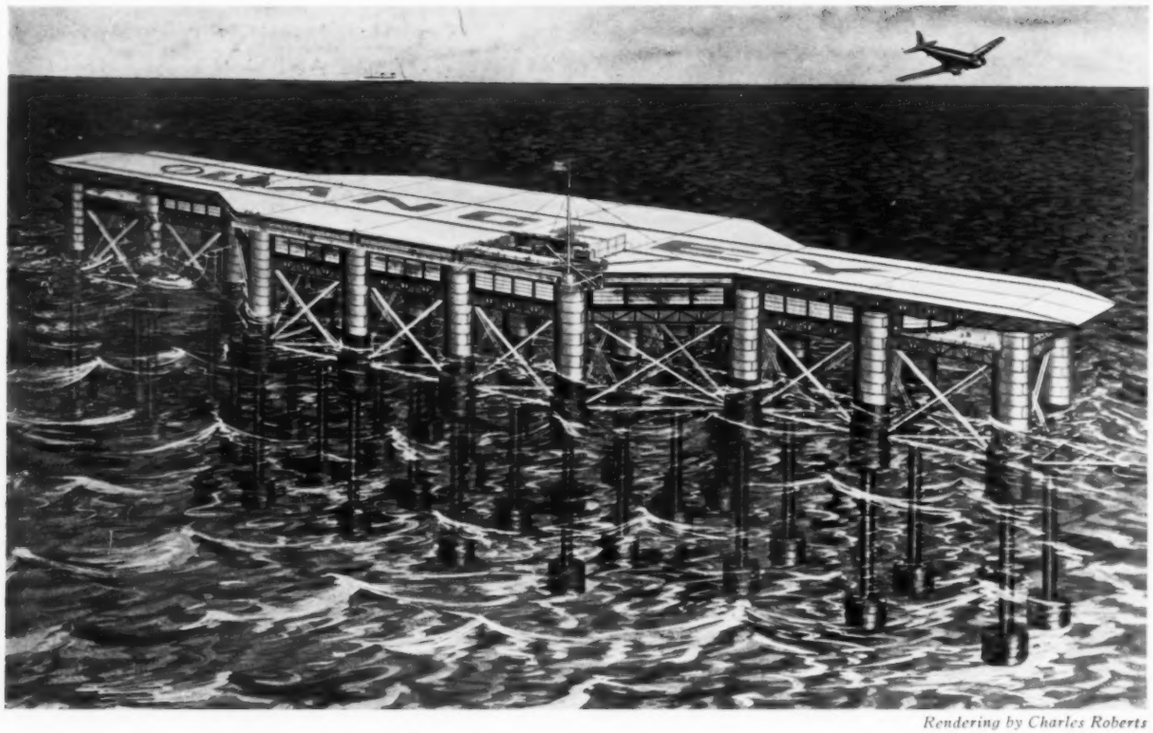
Color scheme: Silver interior, and light blue exterior trimmed with silver and black. The main arch has black outer bands and graded blue reeds and silver cross bands.



Courtesy of AMERICAN LUMBERMAN



Photographs by J. L. Mutzbauer

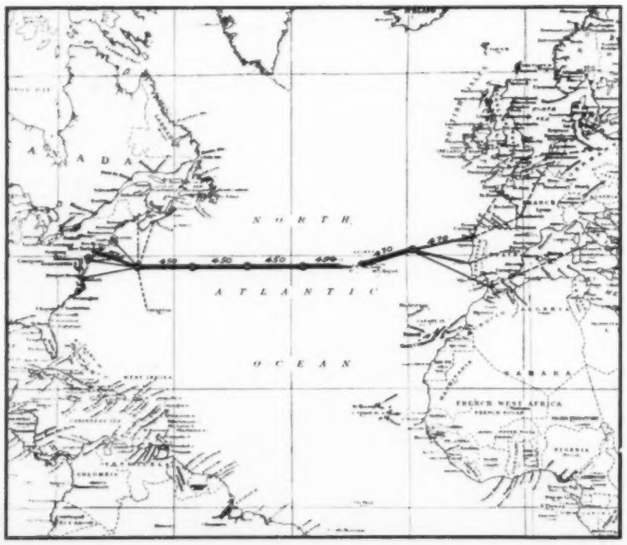


Rendering by Charles Roberts

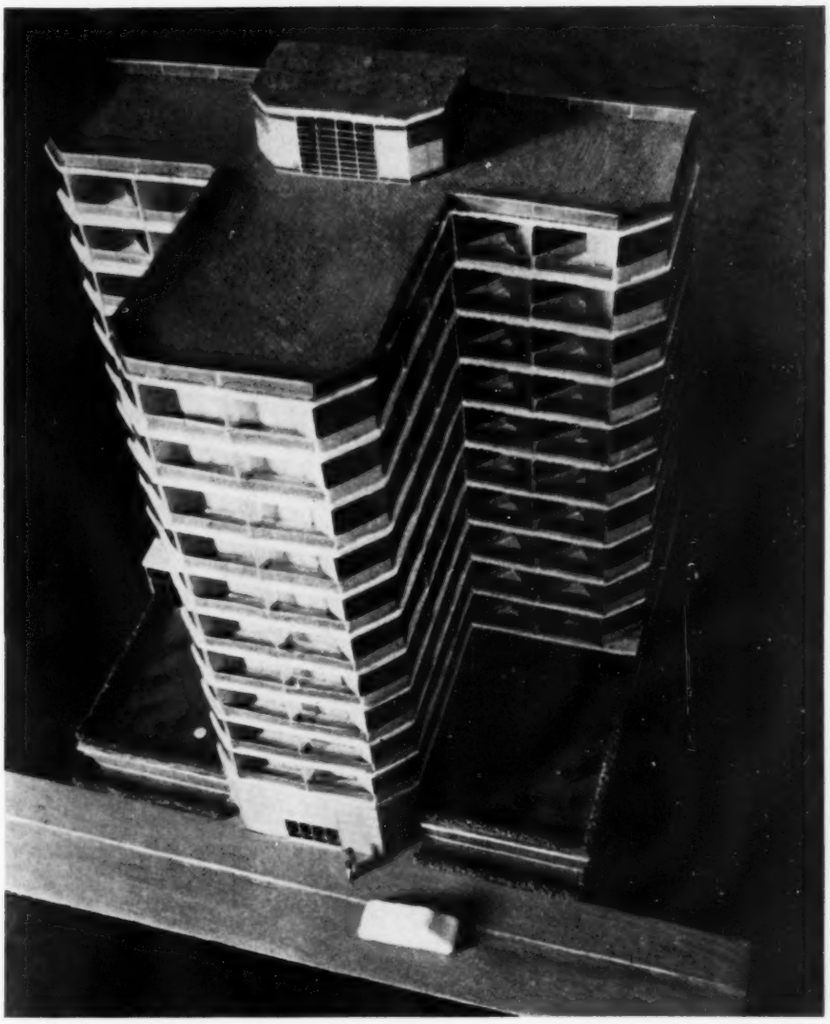
SEADROME DESIGN BY EDWARD R. ARMSTRONG

About a year ago the Seadrome Ocean Dock Corporation applied to the Public Works Administration for a loan of approximately $30,000,000, to be used to build and permanently anchor at sea five Armstrong seadromes. These were to be 1,225 feet long on deck, 300 feet wide at the center section and 150 feet wide at the narrower ends.

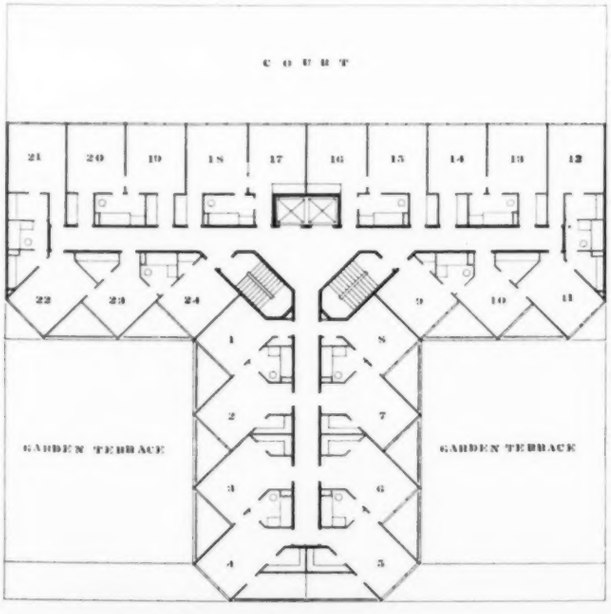
Because approval of the State Department, the War Department, and particularly the Navy Department was also necessary, the Secretary of Commerce suggested that the President appoint a committee to study the project. This committee was created. The Department of State expressed the opinion that this government had a right to anchor such seadromes above the high seas, provided that their purpose was peaceful. Under consideration now is a plan to build one complete seadrome of greater length than originally contemplated in order to permit very heavily loaded planes to take off and land with complete safety.



344 A TRANS-ATLANTIC SEADROME ROUTE



GOTHAM GROUP HOUSE
MILTON LOWENTHAL, DESIGNER



● TYPICAL FLOOR PLAN
SCALE IN FEET 0 5 10

Architectural Problem:

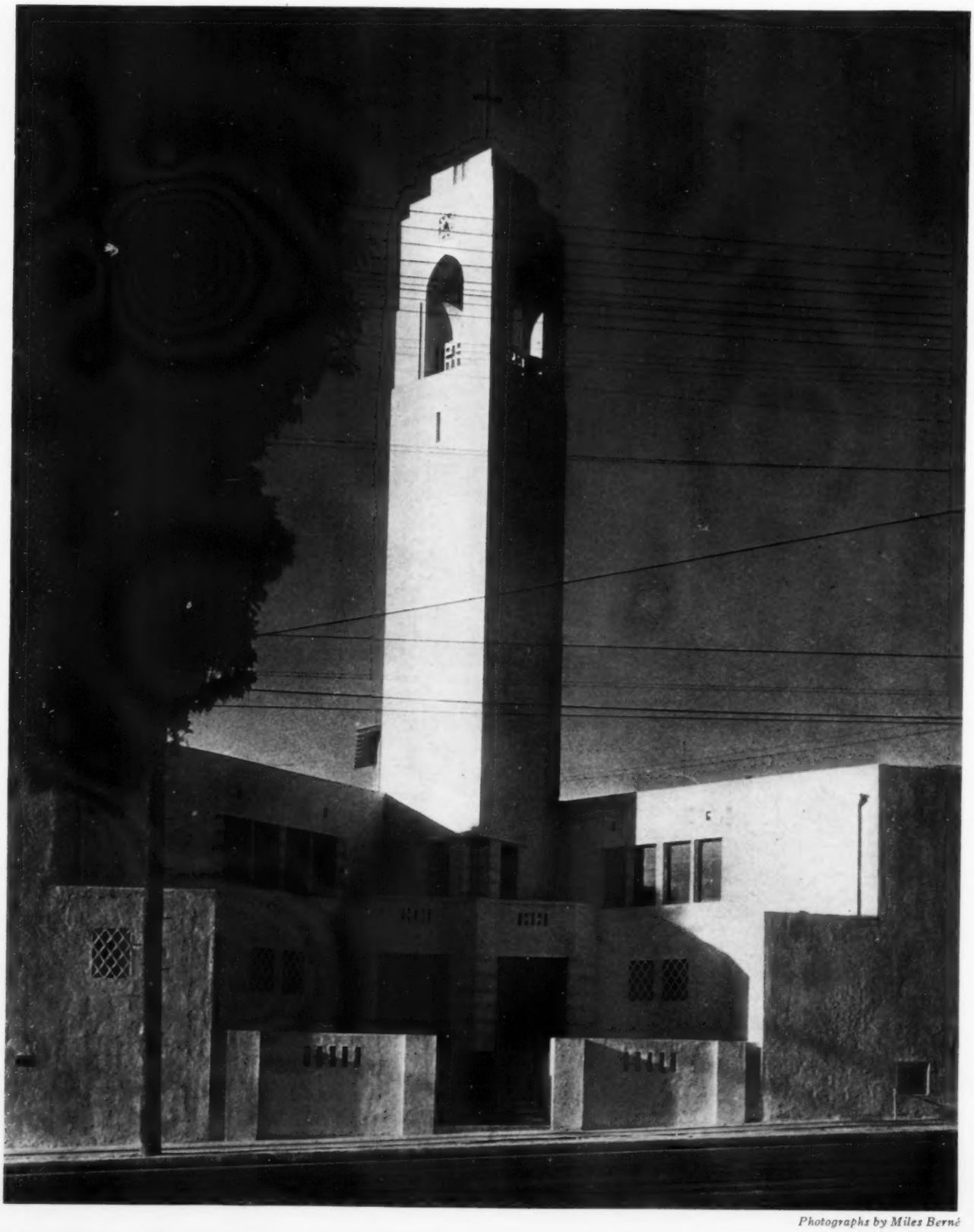
To provide the largest number of desirable rooms on an inside city lot, also facilities for social and recreational activities. The T-plan was selected for the sake of efficiency. Diagonal rooms utilized to provide privacy, balconies, the use of the interior corner, and windows running room width. Group facilities include garden terraces, a lounge, dining and meeting space, half story above street level; reading and writing rooms, lobby, office, gymnasium and pool below street level.

Social Problem:

To provide a satisfactory substitute for the rooming house. The Gotham Group, in its present temporary quarters, provides the following activities—group dinners, community kitchens, group buying, placement service, emergency loans, made work and house scrip, medical and nursing service, local counsel, house library, and recreation. Extension of this plan contemplates other activities—group insurance, adult education, special classes and round table discussions, group workshop, and exhibition rooms. The movement, which began in 1928, has as its purpose the establishment of "living centers" based upon group economics.

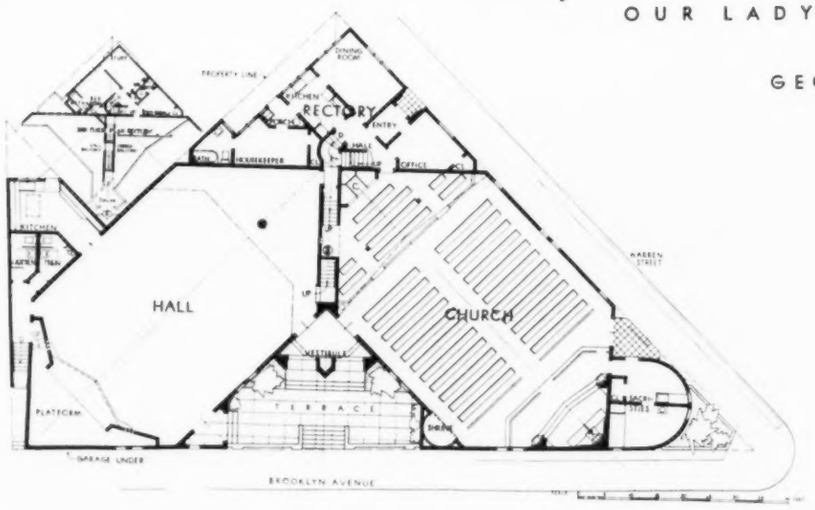
A COMMUNITY GROUP APARTMENT HOUSE

A LOW-COST CHURCH IN LOS ANGELES



Photographs by Miles Berné

OUR LADY OF LEBANON CHURCH
LOS ANGELES
GEORGE J. ADAMS, ARCHITECT

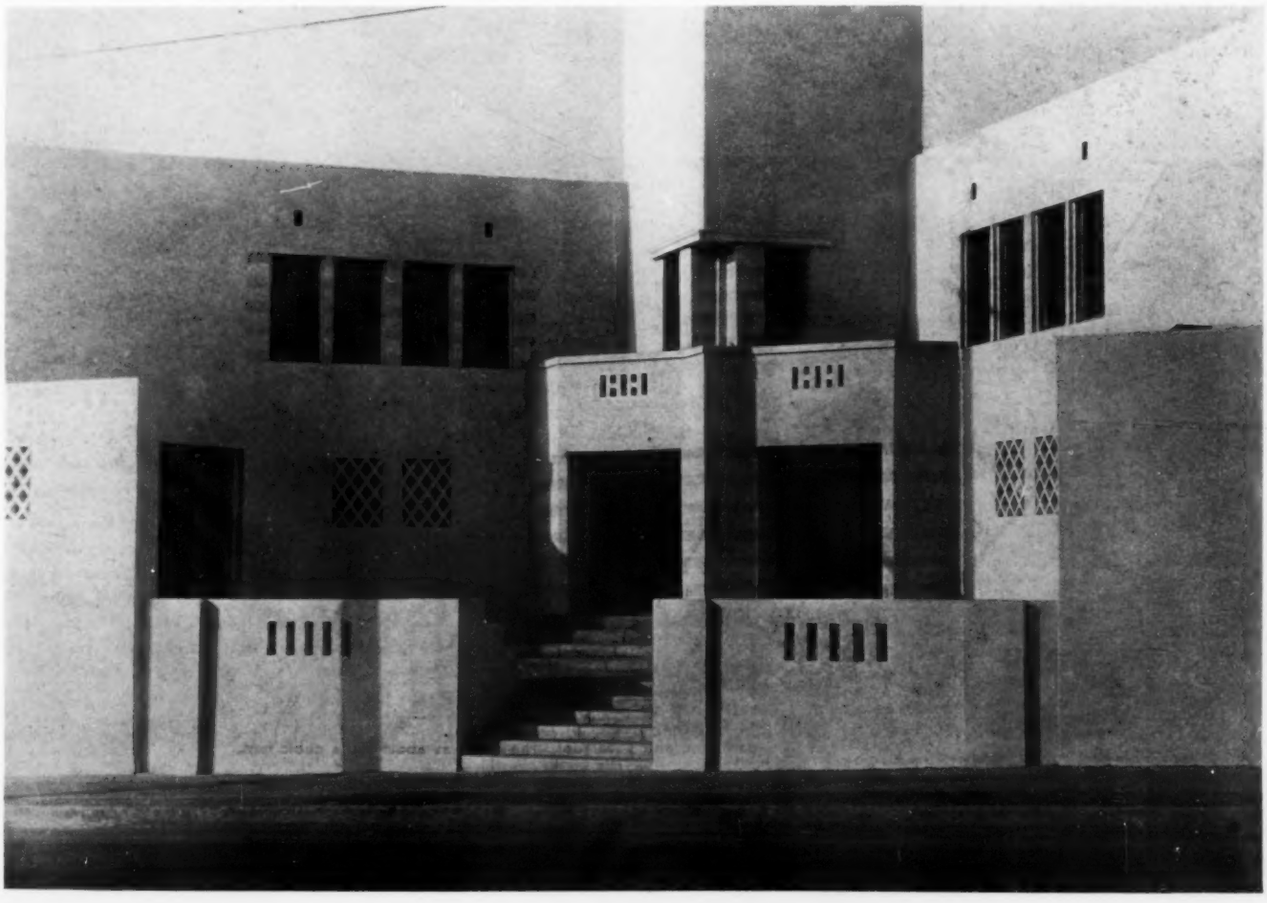


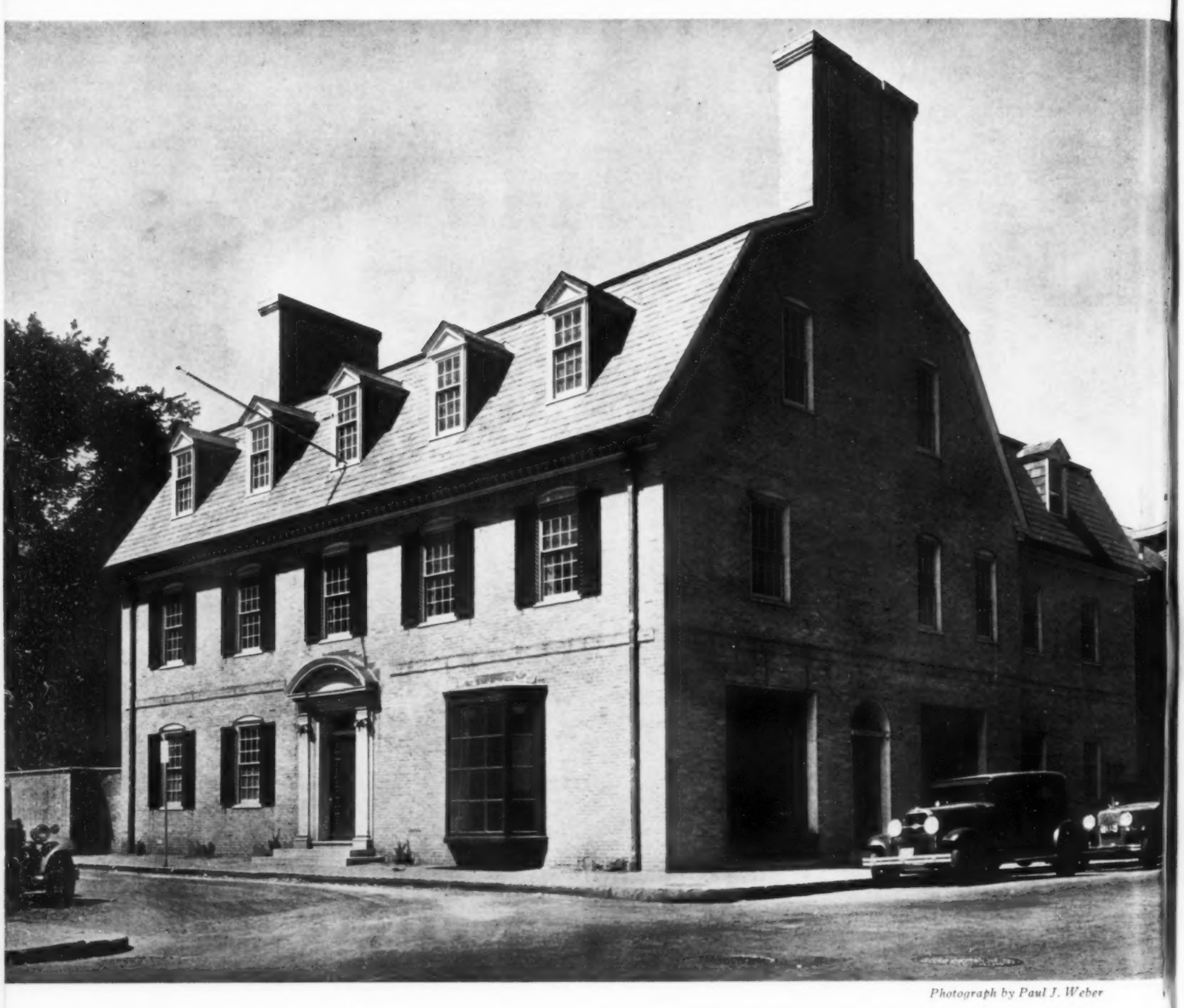
This church, completed in June last year, cost $12,000, or 7.7¢ a cubic foot. This cost includes the architect's fee, two stained glass windows and folding banquet tables for the hall, but excludes cost of church pews and stations of the cross.

Construction: Concrete foundations and terrace walls. Concrete walls, floor and slab over garage. Wood frame construction with roofs supported by stock bowstring trusses. Exterior, cement plaster on galvanized netting, interior of hardwall plaster finished with parchment color stucco. Floors of ½-inch thick oak over pine subfloor, with tile in baths and toilets. Composition roofing. No heating is provided except in the rectory where individual gas wall heaters are installed. No forced ventilation. A large, wind-driven rotary ventilator on the roof can be used to draw air from either of the two balconies or the confessional.

Seating capacity of the church: 350.

Seating capacity of the hall: 400.





Photograph by Paul J. Weber

PERRY, SHAW AND HEPBURN
ARCHITECTS

The D. U. Clubhouse occupies a plot 60 by 90 feet on the corner of Mt. Auburn and Dunster Streets, Cambridge, Massachusetts. The building was planned for club activities for a limited number of members and includes a store 22 by 44 feet for rental purposes.

Entrance to the Club is from Dunster Street and from the vestibule a door to the left gives access to the visitors' room. Beyond is a spacious hall with circular stair and curved end wall. In line with the needs of a building of this sort a billiard room and coat and washroom are provided on the main floor, a lounge or living room, library and private dining room on the second floor, besides living quarters for the steward. The third floor comprises a large banquet hall with necessary kitchen and serving rooms. In the basement is a squash court, showers, locker and toilet rooms, boiler room, and the store basement.

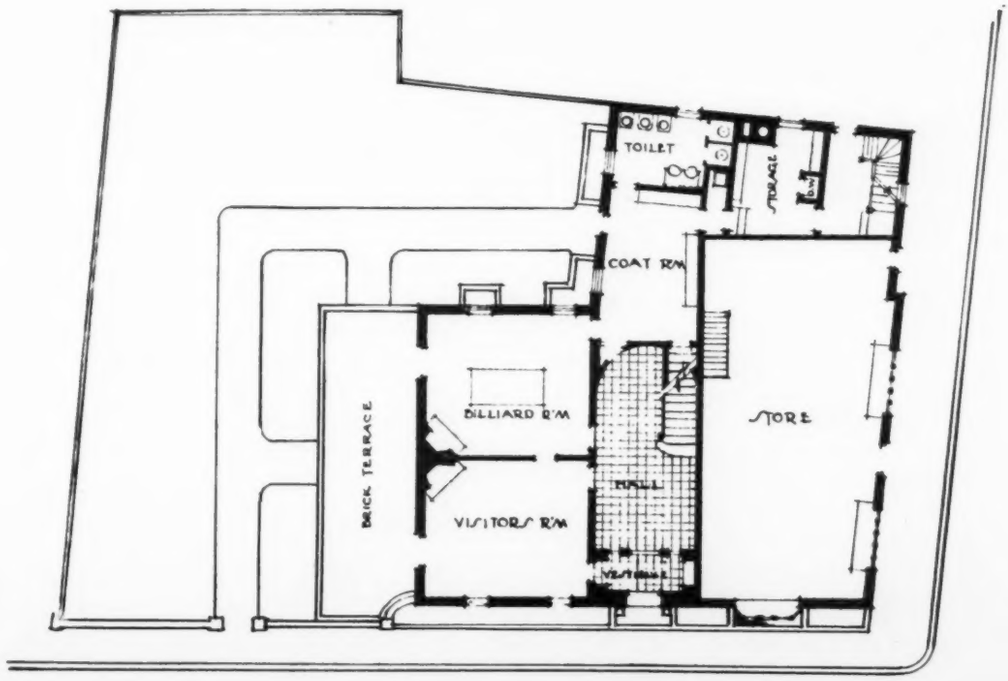
The exterior design is an adaptation of early New England architecture with brick walls, wood trim, and slate roof. The cost was about 55c a cubic foot.

A CLUBHOUSE AT HARVARD

PERRY, SHAW AND HEPBURN, ARCHITECTS

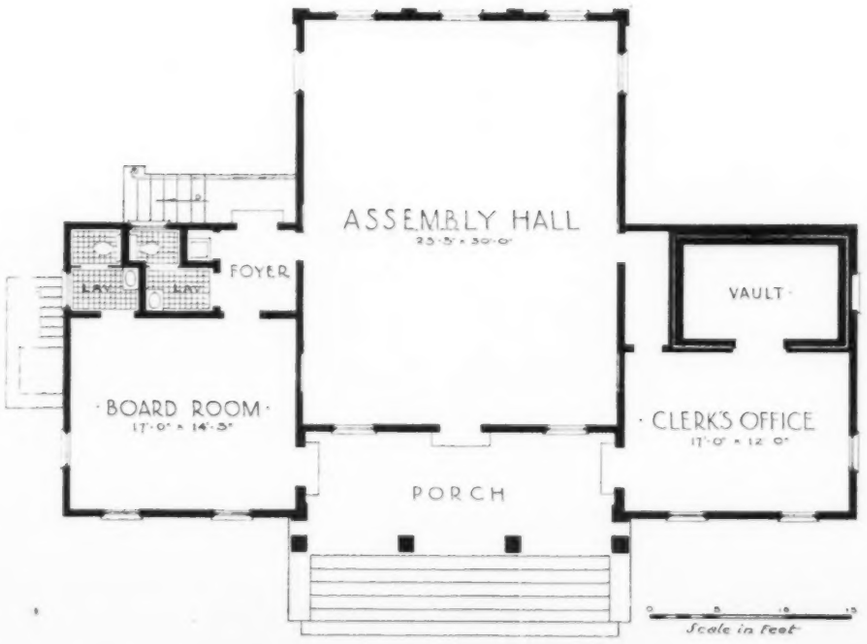
ATTIC FLOOR PLAN

SECOND FLOOR PLAN



FIRST FLOOR PLAN

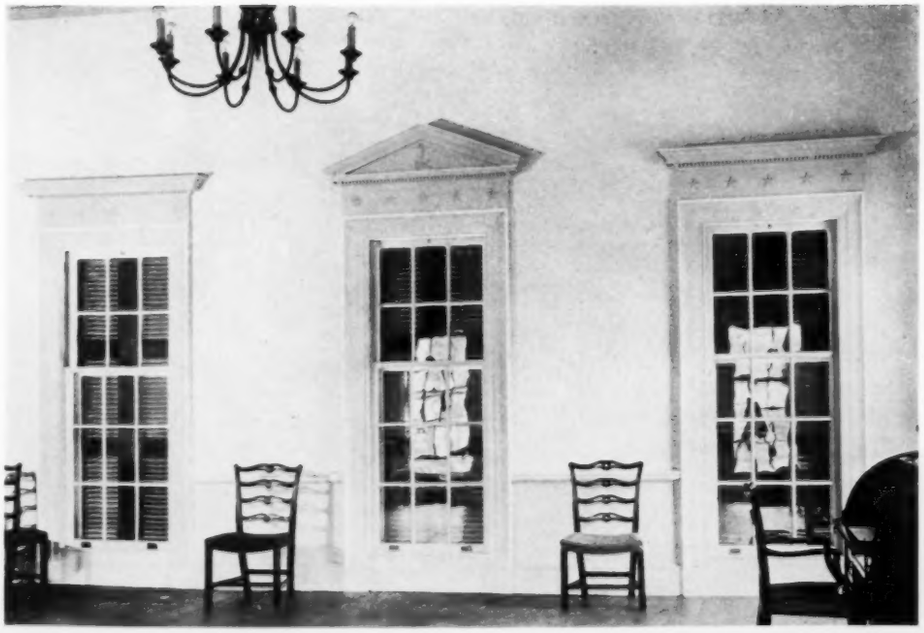
A VILLAGE HALL



The village hall was built as a general gathering place; it is used for elections and for displaying tax maps, occasional art exhibits, and documents of local interest. The building contains a fireproof vault of reinforced concrete for records.

Frame construction. Exterior: Wood clapboards and flush boarding. Roof: White cedar shingles, unstained and left to weather.

Color scheme of assembly hall: Tones of gray with white moldings. The stars and anchor on frieze in pediments of interior windows and doors are blue.



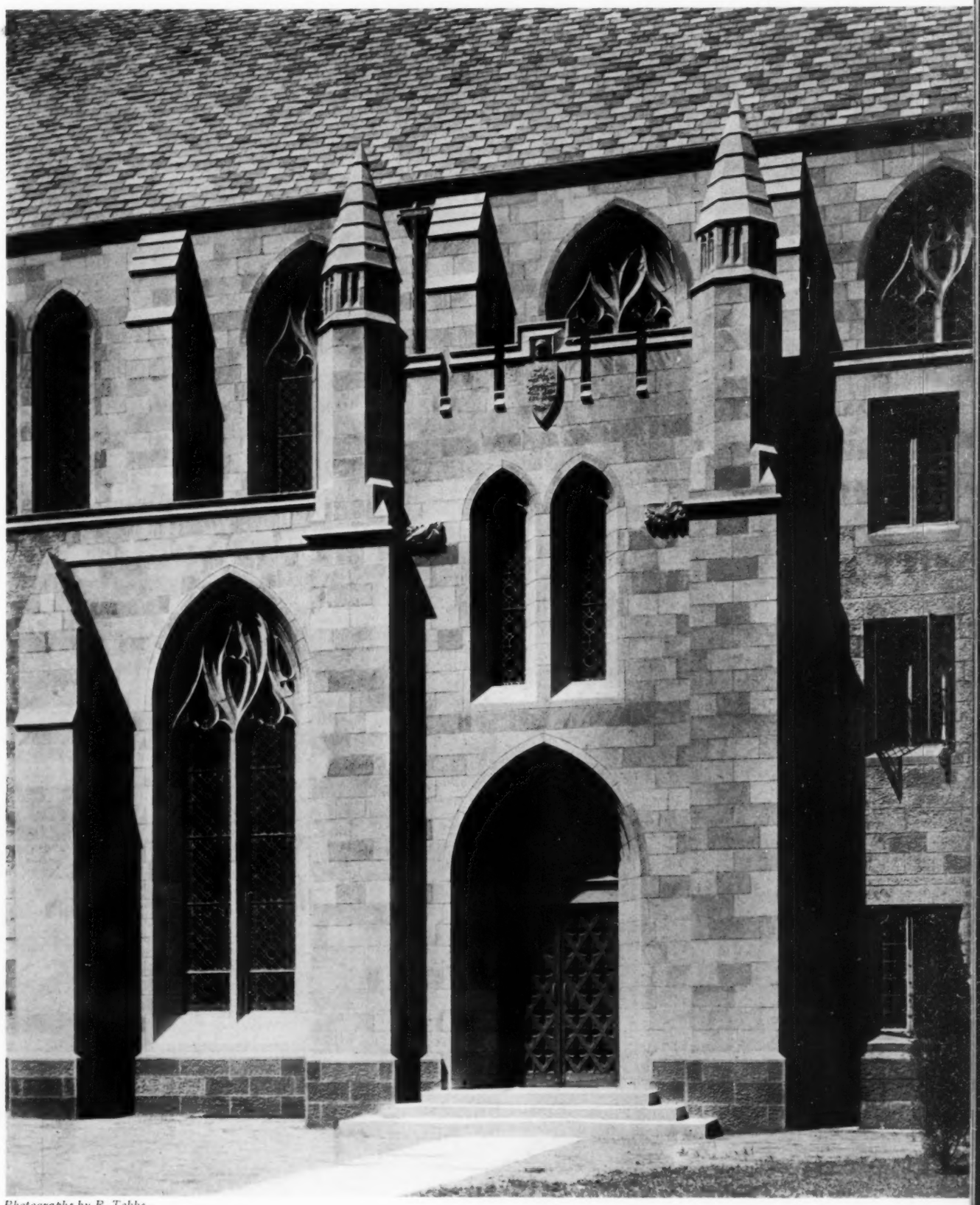
VILLAGE HALL
DERING HARBOR
NEW YORK

ALFRED EASTON POOR
ARCHITECT

ALFRED EASTON POOR
ARCHITECT

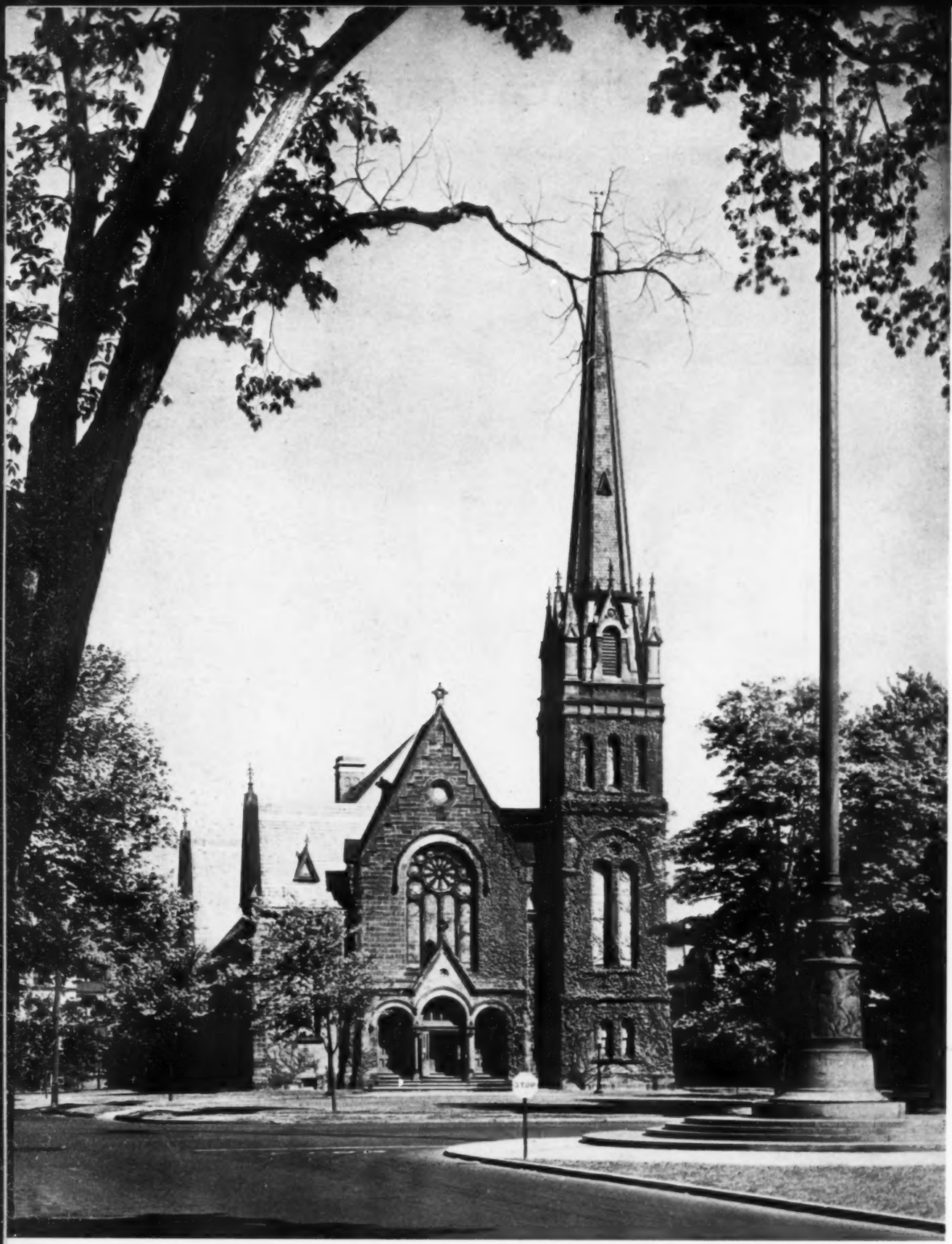
The eagle in the pediment is gilded wood. The shield contains the coat of arms of the village and is of wood painted blue and white. The incised lettering is gilded.

MODERNIZATION and ALTERATION



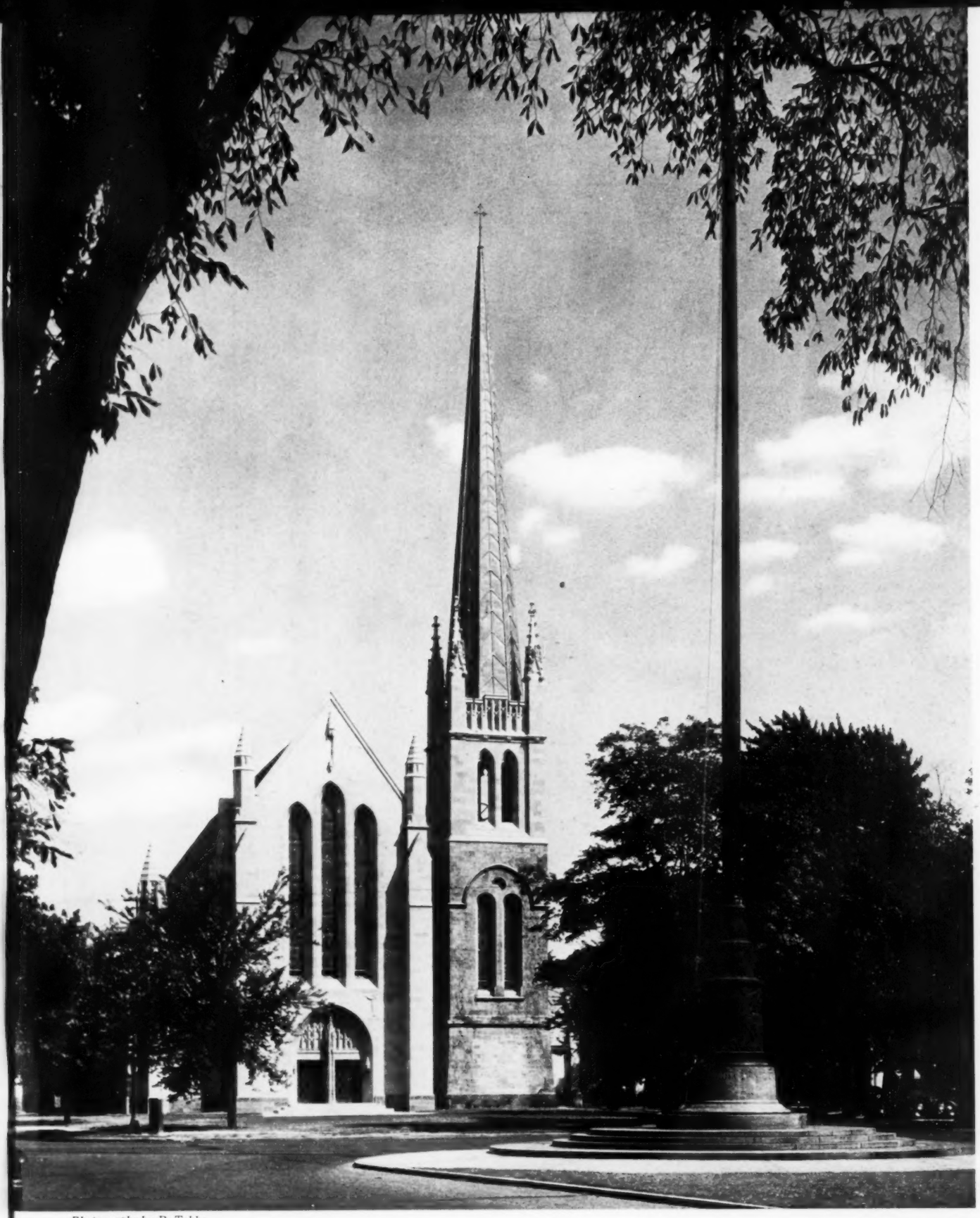
Photographs by R. Tebbs

CRESCENT AVENUE PRESBYTERIAN CHURCH AT PLAINFIELD, NEW JERSEY
ZANTZINGER, BORIE AND MEDARY, ARCHITECTS



BEFORE MODERNIZATION

CRESCENT AVENUE PRESBYTERIAN CHURCH AT PLAINFIELD, NEW JERSEY



Photographs by R. Tebbs

AFTER MODERNIZATION

ZANTZINGER, BORIE AND MEDARY, ARCHITECTS

Photographs by Wurts Bros.

BEFORE MODERNIZATION

109-111 DIVISION STREET APARTMENTS
NEW YORK CITY
HERMAN M. SOHN, ARCHITECT

AFTER MODERNIZATION

Photographs by Wurtz Bros.

BEFORE REMODELING

15 THIRD PLACE, FRANKLIN COURT
GARDEN CITY, LONG ISLAND
SLEE AND BRYSON, ARCHITECTS

AFTER REMODELING

In this development old houses are altered to order for purchasers who agree to pay from $8,400 to $9,000, according to their selection of plans furnished by the builders. An average of $6,000 is spent on each house for alteration work.

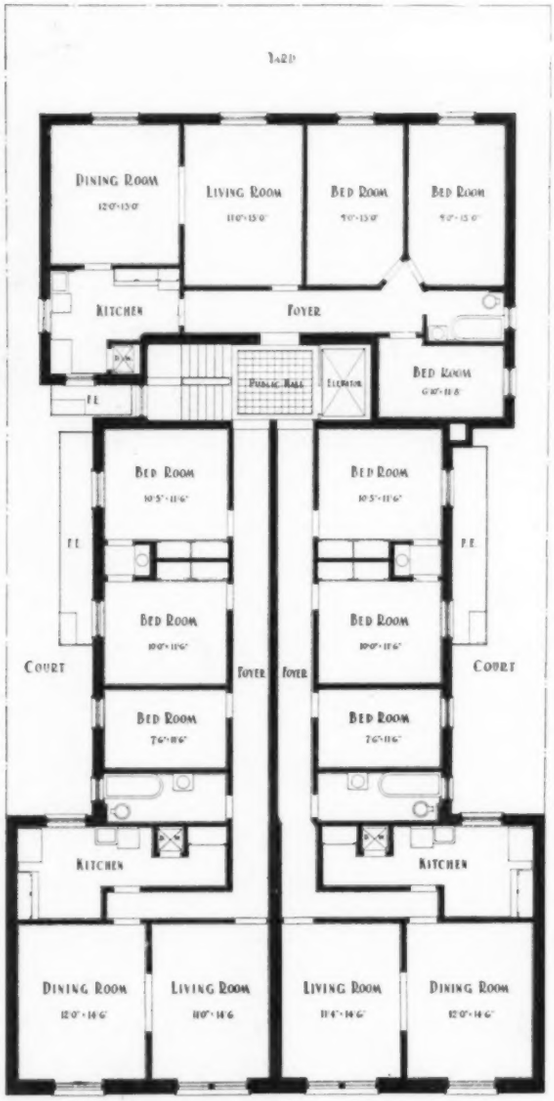
The houses when altered have 6 rooms, tiled bath, kitchen with all new conveniences. A garage is added together with a bedroom above. In the rear of the house is an open porch. Heating: steam system with oil burner.

APARTMENT HOUSE ALTERATIONS
439 WEST 123 STREET, NEW YORK CITY
CHARLES H. LENCH, ARCHITECT

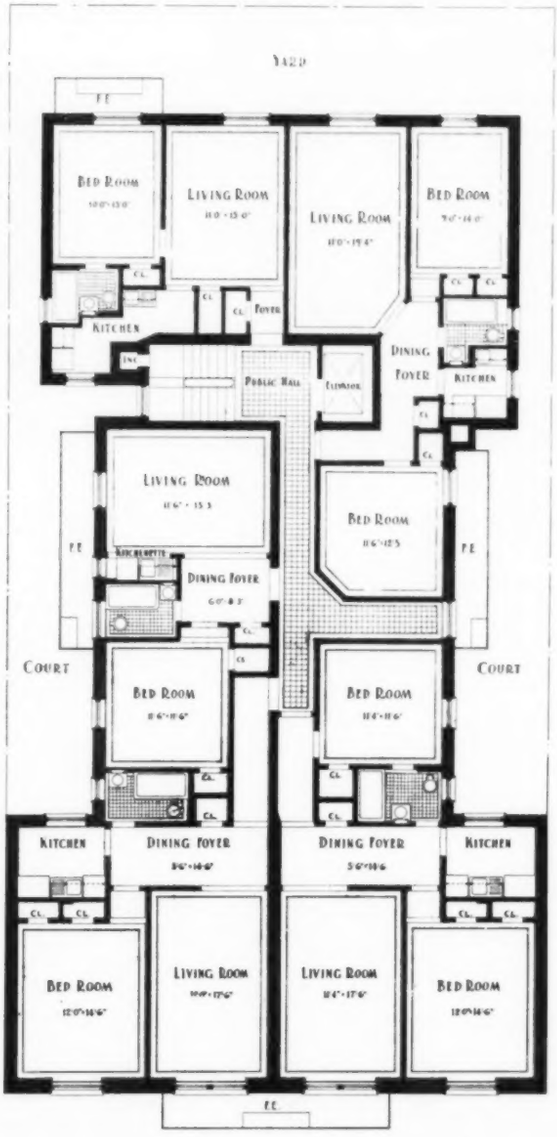
Nature of alterations: General demolition of interior construction. Excavation for new boiler and elevator pits. Existing masonry patched and pointed. Entire front of building sandblasted. New Ruberoid roof together with new metal skylights, flashings, gutters and the like. New stud partitions with new trim and new doors. Windows throughout newly caulked. Bathrooms tiled, and entrance hall and lobby surfaced with rubber tile. New plaster throughout practically the entire building. New hardware, including new gas ranges, electric refrigerators, and window shades in each apartment. New fire escapes. New Otis self-service elevator substituted for old lift. New electric wiring and fixtures. New system of plumbing, gas, water supply and heating.

When preliminary sketches were first prepared the building was vacant; it is now 100% rented.

ORIGINAL PLAN ARRANGEMENT



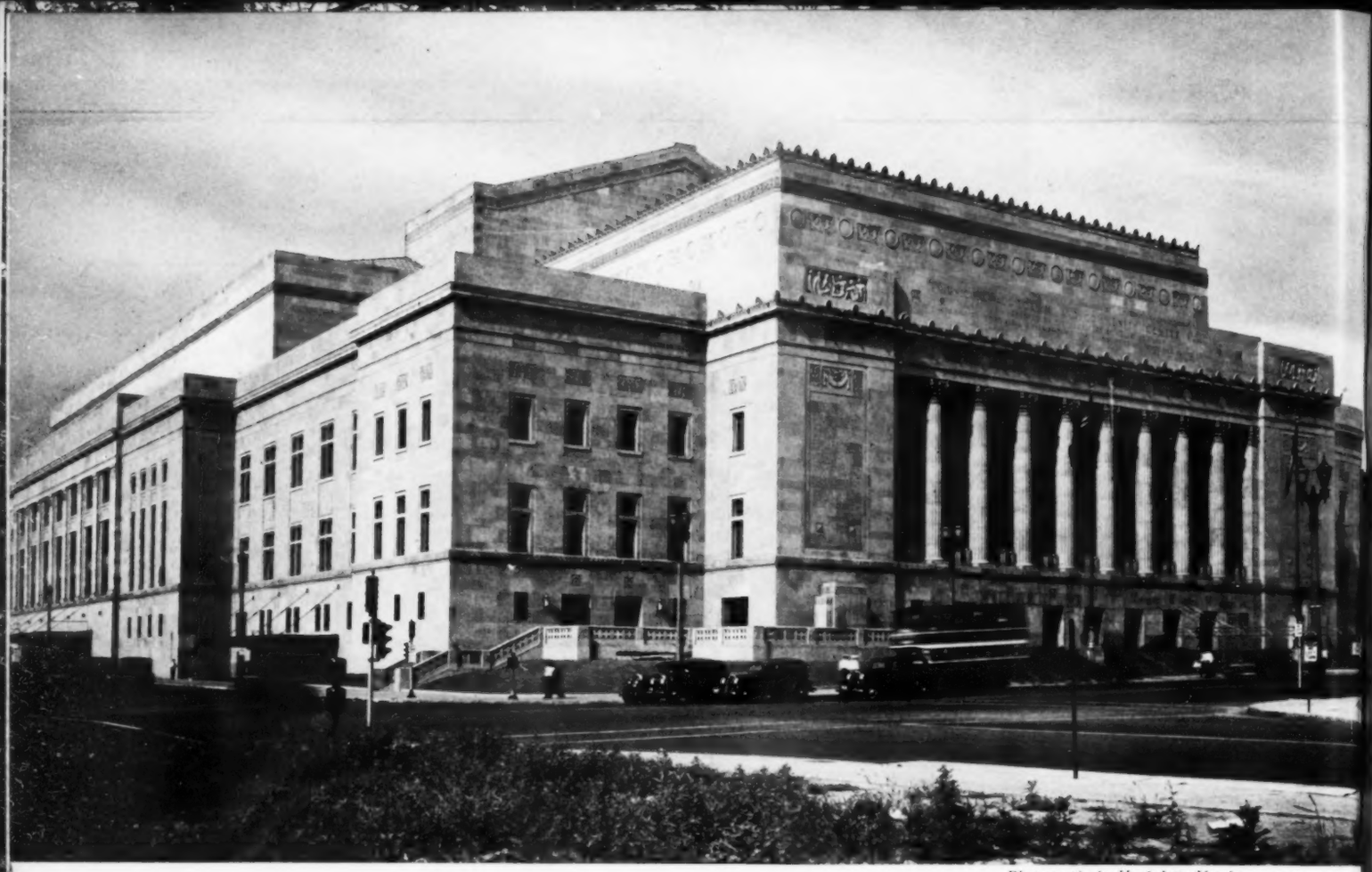
NEW PLAN—AFTER ALTERATIONS



Photograph by H. Aylette Meade

In 1923 when a bond issue was voted by St. Louis for the erection of a civic group on the Memorial Plaza, of which this building is a unit, a company known as Plaza Commission, Inc., was formed to design and supervise the new buildings. The late J. L. Mauran of the architectural firm of Mauran, Russell and Crowell was president of this Commission; he was also a president of the American Institute of Architects. The secretary of the Commission is Louis La Beaume, in whose office (La Beaume and Klein) the plans of the Auditorium were prepared. William B. Ittner, well-known school architect, is now president of the Plaza Commission.

ST. LOUIS MUNICIPAL AUDITORIUM and COMMUNITY CENTER



Photographs by H. Aylette Meade

GENERAL VIEW OF BUILDING FROM NORTHEAST

THE new Municipal Auditorium and Community Center Building is one of several projects provided for in the eighty-seven million dollar bond issue passed by St. Louis voters in 1923. Funds were approved for the acquisition of land for a Memorial Plaza and two specific amounts set up for buildings. One was for the Civil Court House—four million dollars; the other for the Municipal Auditorium—five million dollars. A third building, the Soldiers Memorial, was also contemplated and funds for it, in the amount of one million dollars, were tentatively included in the sum granted for the purchase of the land.

In due course, ordinances were introduced and a Plaza Commission, composed of eight architects and two engineers, was created to design all features connected with the Plaza, including the buildings. The Plaza Commission, instead of establishing a general office, divided itself in groups to study the different elements involved. As a result of these subdivisions, the studies prepared by La Beaume and Klein were approved by the Commission and the design of this building allocated to this office. An elaborate program, specifying the uses of the building, had previously been prepared in consultation with city officials and all of the local groups interested in its use.

REQUIREMENTS

It was decided that the building should provide for a large auditorium, or arena, with a seating capacity of not less than twelve thousand persons; a theater, or music hall, with a seating capacity of approximately thirty-five hundred; several smaller recital, or assembly halls, with seating capacities of seven hundred or more. In addition to these principal features, it was necessary to provide the maximum amount of exhibition space consistent with the dimensions of the site and the terms of the budget.

The site measures approximately 322 feet from east to west and 493 feet from north to south. Therefore, it became necessary to consider the use of a common stage to serve both the arena and the music hall. It also seemed advisable to place the exhibition space under these features and extending over the complete area. Thus the music hall and arena were elevated above the street levels, and the exhibition space depressed below.

In addition to the main elements, foyers, corridors, committee rooms, rest rooms and many types of service space were required. The most decorative unit of the building, i.e., the music hall, faces on the Memorial Plaza and is directly accessible from it. The mass of the music hall is flanked on either side by masses each containing two assembly halls with separate means of entrance and egress. The theater, or music hall, is separated from the arena by a stage 142 feet from east to west and 48 feet in depth. The arena occupies the main portion of the lot extending to the south. Each element is independent of the others, and each part of the building can be used without interference with activities in any other part. Also, the entire building can be used as a unit, as circulation has been provided between all of the elements.

Seven entrances under the colonnade give access to the ticket lobby of the music hall; broad stairways at either end of the ticket lobby lead to the main lobby of the theater and to the lobbies on the balcony and upper levels. Elevators are also provided in this unit. Likewise stairways and elevators provide access to the assembly halls.

The exhibition space and arena are accessible from the side streets—Fourteenth and Fifteenth Streets. These units are served by spacious lobbies on the street level, and the different lower and upper levels are reached by six ramps. One of these ramps has been especially designed to permit the entrance of trucks, large machinery, and the like.

CONSTRUCTION FEATURES

The foundations of the building are carried on 365 caisson columns sunk to rock at depths varying from 27 to 80 feet below the datum point, which is the level of the exhibition floor; there are also 50 spread footing columns.

Both the auditorium and music hall are spanned by steel trusses. Nine main trusses carry the roof of the auditorium, or arena. These trusses have a span, from wall to wall, of 266 feet. The height from the arena floor to the center of dome is 97 feet. The height from the datum level of the exhibition space to the ridge of the auditorium, or arena, is 170 feet. The music hall proscenium has a width of 63 feet by a height of 49 feet. The proscenium on the auditorium, or arena, side has a width of 95 feet and a height of 41 feet. The steel soundproof curtains closing both these stage openings were furnished by Peter Clark, Inc., and weigh respectively 21 and 31 tons.

The stage is completely equipped electrically and mechanically for performances of every character. When both steel curtains are raised, the stage may serve both the auditorium and the music hall, with a

EAST FACADE SHOWING ENTRANCE TO ARENA AND EXHIBITION SECTION

Photographs by W. C. Parsons

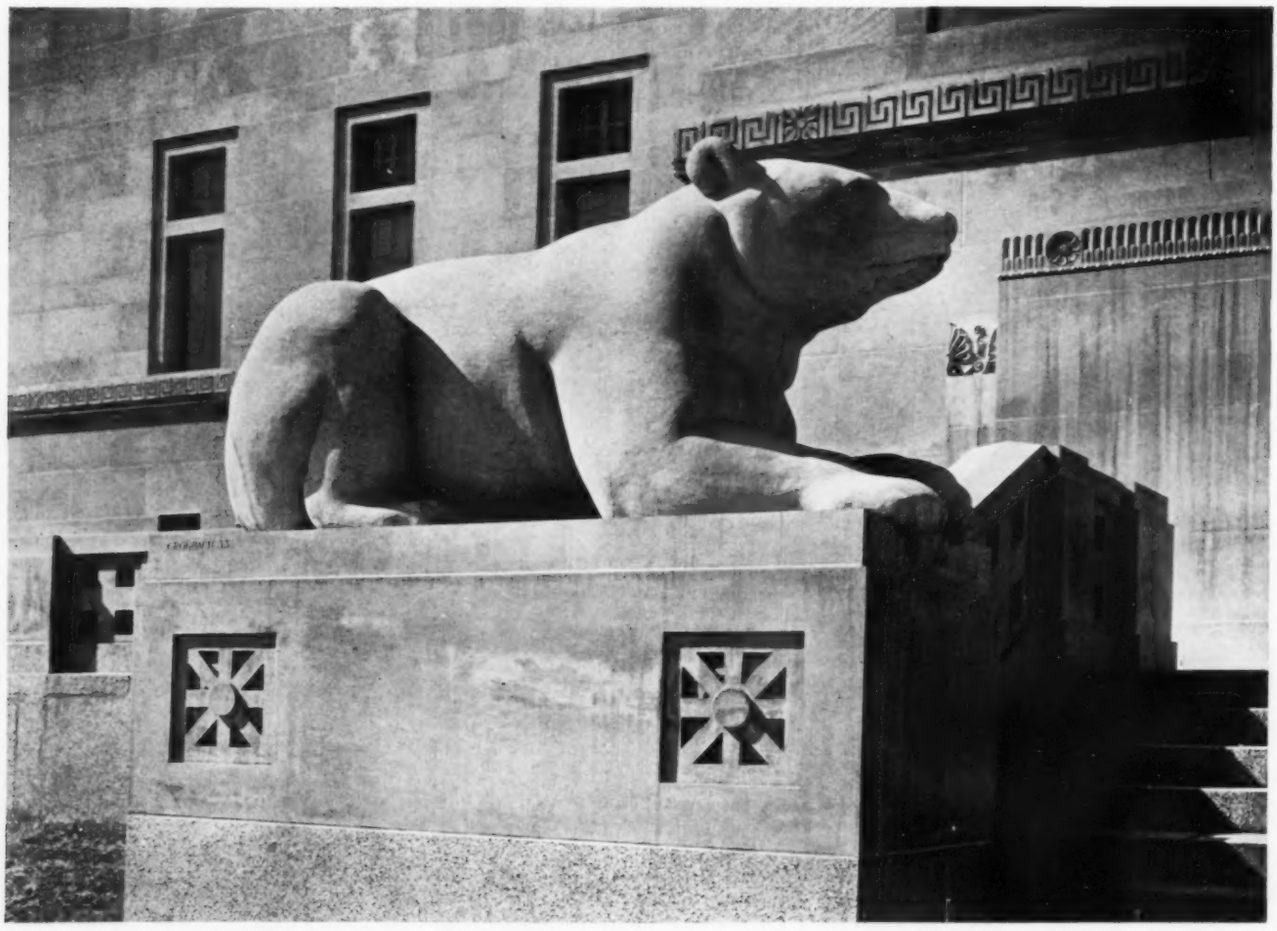
combined seating capacity of 15,600, for mass meetings, conventions, and so on. Dressing rooms are provided in several tiers for stars, principals and chorus, men and women, on either side of the stage. Twenty-seven committee rooms are arranged around the arena section for use during large conventions.

The building is heated from a central municipal plant three blocks away. Fifteen fan rooms serve different sections of the building. Air conditioning is specified for the main units.

The exterior walls of the building are faced with Indiana limestone; the pitched roofs are covered with cement tile. All interior wall surfaces are plastered and in some cases wainscoted with marble. The floors are of marble in the important public spaces and lobbies serving the music hall; monolithic or tile terrazzo in subsidiary spaces, and cement in service areas.

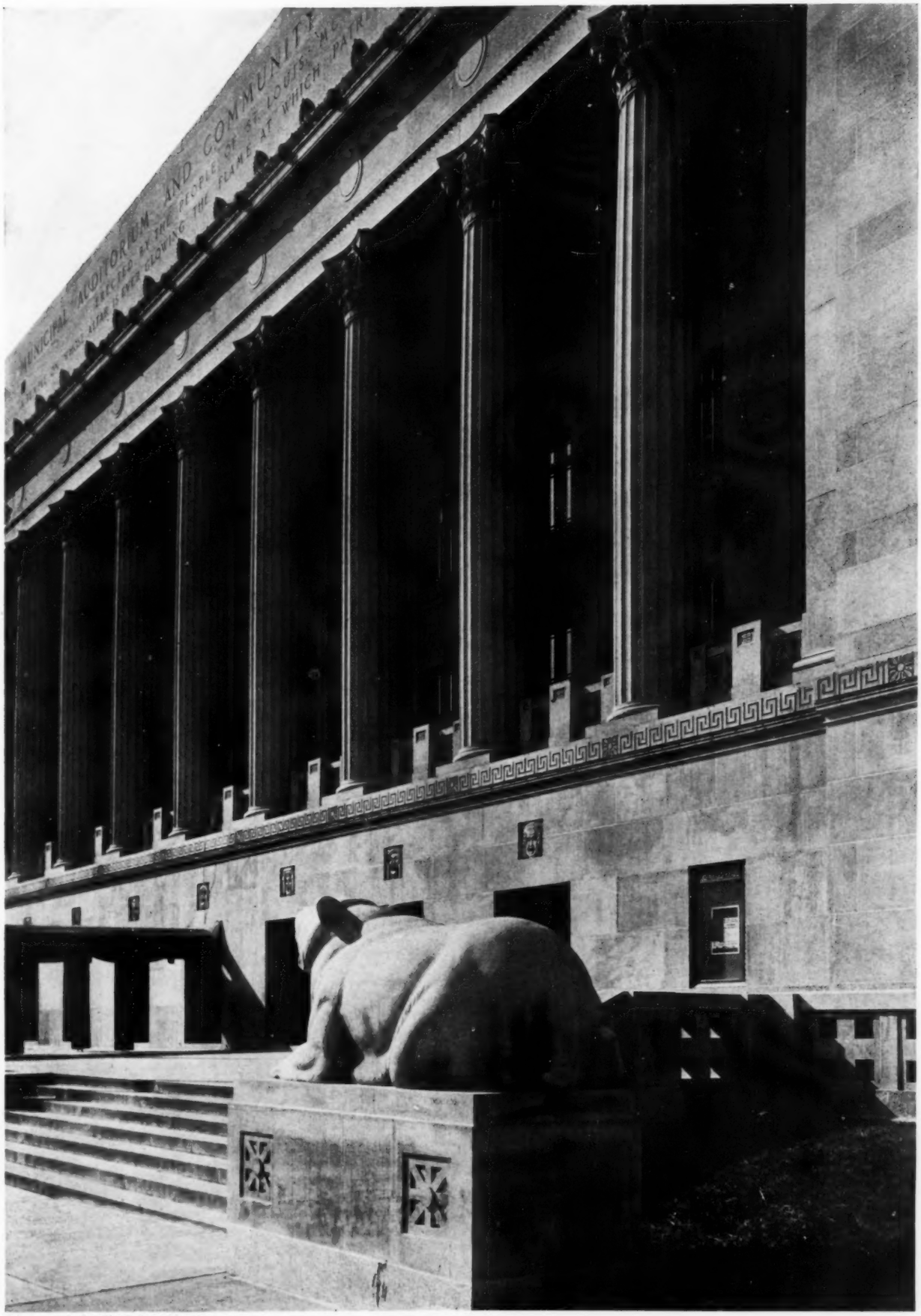
No special parking facilities have been provided since the building is surrounded by four streets and faces the Plaza. Parking regulations covering an area of four blocks in every directioin will permit convenient parking facilities for approximately ten thousand persons.

DETAIL OF ENTRANCE SCULPTURE BY ROBERT CRONBACH

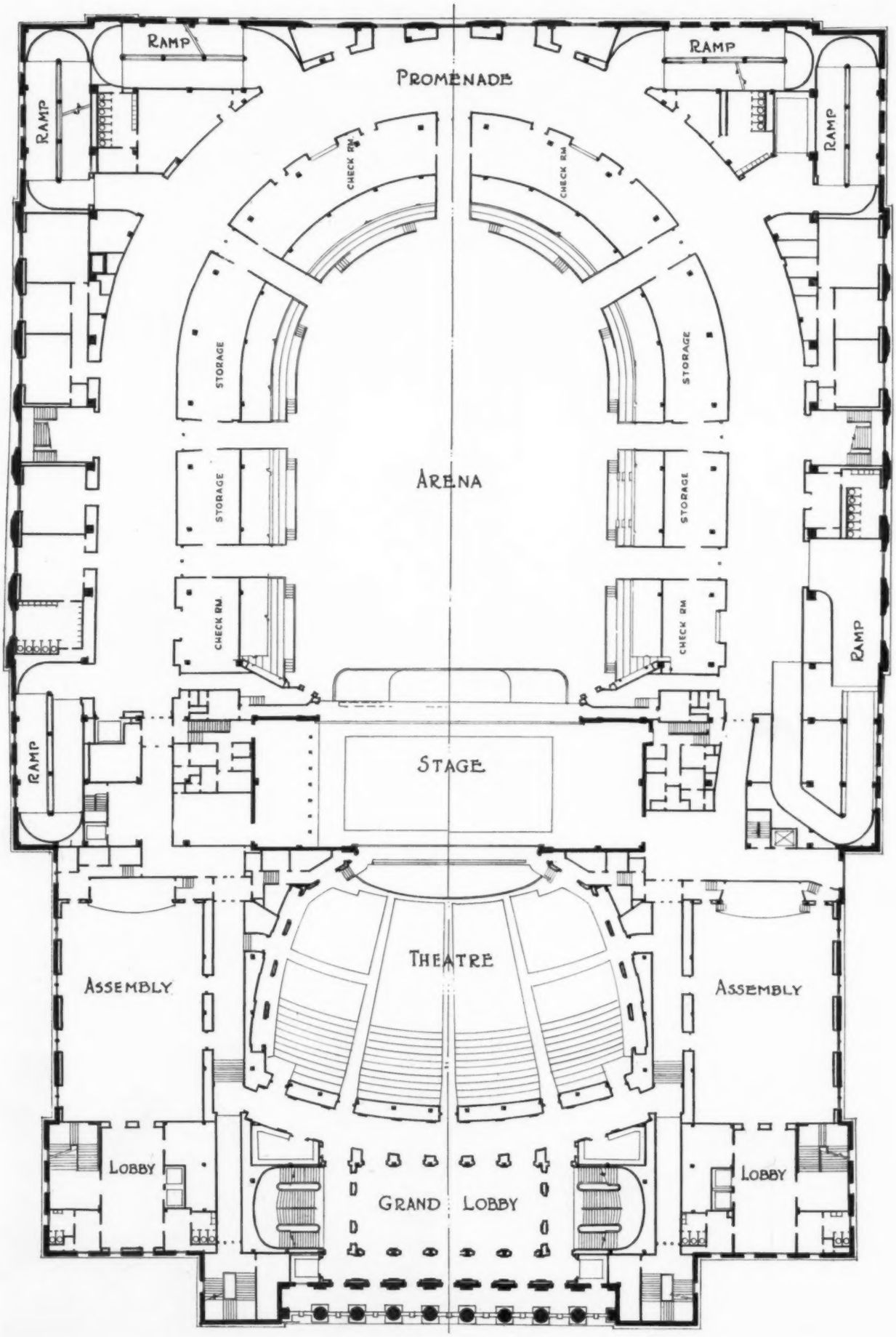


CONSTRUCTION BEGUN AUGUST 11, 1932 — BUILDING COMPLETED APRIL 14, 1934

MUSIC HALL COLONNADE



Photographs by H. Aylette Meade



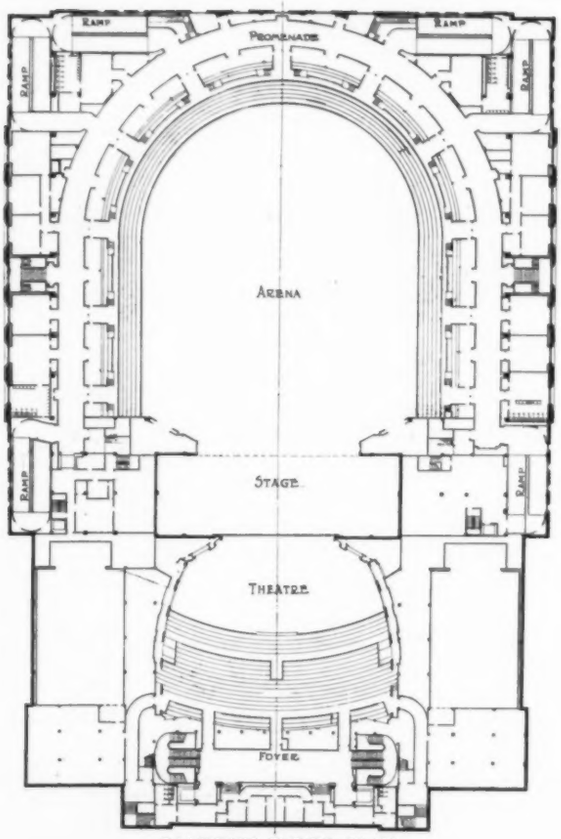
MAIN FLOOR PLAN

Photographs by H. Aylette Meade

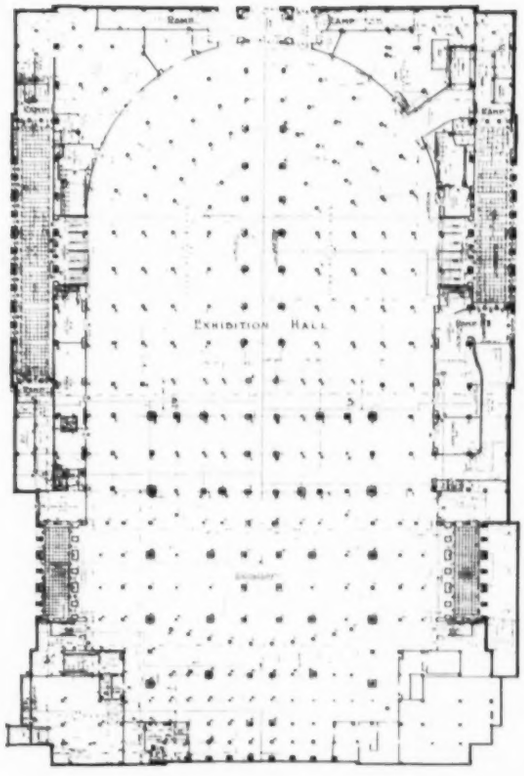
(ABOVE): DETAIL OF EXTERIOR ENTRANCE.

(RIGHT): ENTRANCE LOBBY TO MUSIC HALL

It was early decided that the building should provide for a large auditorium, or arena, with a seating capacity of not less than twelve thousand persons; a theater, or music hall, with a seating capacity of approximately thirty-five hundred; several smaller recital, or assembly halls, with seating capacities of seven hundred or more. In addition to these principal features, it was necessary to provide the maximum amount of exhibition space consistent with the dimensions of the site and the terms of the budget.



BALCONY FLOOR PLAN



EXHIBITION FLOOR PLAN

MUSIC HALL: VIEW TOWARD STAGE

Photographs by H. Aylette Meade

SEATING CAPACITY OF MUSIC HALL: APPROXIMATELY 3,500 PERSONS

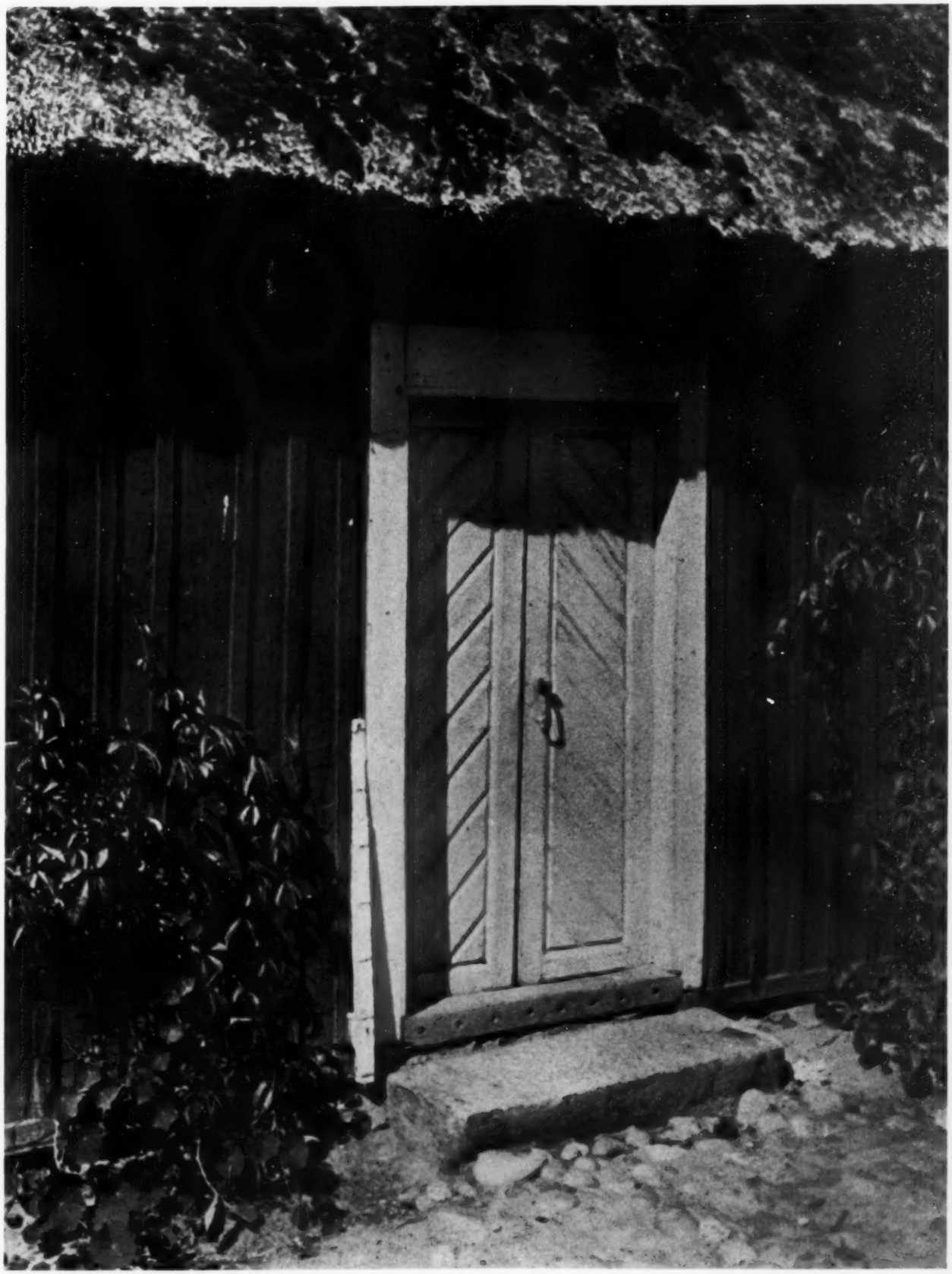
MUSIC HALL BALCONIES

ASSEMBLY HALL

EXHIBITION SPACE UNDER MUSIC HALL AND ARENA

Photographs by W. C. Parsons

PROVINCIAL SWEDISH ARCHITECTURE



PHOTOGRAPHS BY R. W. McLAUGHLIN, JR.

FARM BUILDING NEAR HÄLSINGBORG, SWEDEN

GATEWAY TO A CASTLE IN SCANIA

PHOTOGRAPHS BY R. W. McLAUGHLIN, JR.

A BLACKSMITH'S SHOP IN SCANIA

PHOTOGRAPHS BY R. W. McLAUGHLIN, JR.

GATE IN A FARM BUILDING AT SKARHULT, SWEDEN

KRONBORG CASTLE
HELSINGÖR, DENMARK

DOORWAY IN HÄLSINGBORG, SWEDEN

TECHNICAL NEWS AND RESEARCH

The following publications cover a study of unit masonry, extending over a 10-year period and conducted at the National Bureau of Standards:

1. "The Cause and Prevention of Kiln and Dry House Scum and of Efflorescence on Face Brick Walls," National Bureau of Standards Technologic Paper No. 370.
2. "Wet Walls and Efflorescence," publication by American Face Brick Association.
3. "Some Absorption Properties of Clay Bricks," National Bureau of Standards Research Paper No. 88.
4. "Some Results of Freezing and Thawing Tests Made with Face Bricks," Proceeding A. S. T. M., Vol. 30, Part II, 1930.
5. "Durability and Strength of Bond between Mortar and Brick," National Bureau of Standards Research Paper No. 290.
6. "Volume Changes in Brick Masonry Materials," National Bureau of Standards Research Paper No. 321.
7. "Water Penetration through Brick-Mortar Assemblages," Journal of the Clay Products Institute, Vol. I, No. 1, September 1931.
8. "The Rate of Stiffening of Mortars on a Porous Base," Rock Products, Vol. 35, No. 18, pp. 18-24, September 10, 1932.
9. "The Properties of Mortars and Bricks and Their Relation to Bond," National Bureau of Standards Research Paper No. 683.
10. "Permeability Tests of 8-in. Brick Wallettes," Proceedings A. S. T. M., Vol. 34, Part II, 1934.

These publications show how the properties of the separate materials—bricks and mortars—are related to the properties of a finished wall of masonry. The subject of design has been left to the architect who is better qualified to deal with that topic, but the possibilities of improving unit masonry (especially from the standpoint of watertightness) through an intelligent selection and adaptation of materials are good, and warrant earnest consideration.

HOW MORTARS CONTRIBUTE TO DRY WALLS

By L. A. PALMER, Construction Department, National Lime Association

A correlation of the results of the Bureau of Standards investigation shows that certain fundamental principles are applicable to masonry generally. Once these principles are understood and their importance appreciated, one is able to apply them to particular problems. In so doing, it is necessary that the reader accept statements that in the light of recent research are obviously true. Many of them are axiomatic.

1. Water tends to become distributed throughout a wall. All other things being equal, the greater the wall thickness, the less is the probability of any part of it becoming completely saturated.
2. Water follows the path of least resistance. Holes, cracks and open joints are more accessible to its entrance than capillaries or voids in the solid masonry materials.

3. Water that pours into an open joint or crack does not pour out of it. Its exit is by evaporation from the surface of the wall. Water gets in much more quickly than it can get out and hence during a wet season, moisture accumulates in a wall having cracks and open joints.

4. The rate at which a wall dries from the exterior surface is dependent on the porosity of the masonry materials. If the materials are impervious and the wall has openings between bricks and mortar, evaporation can only take place through these openings. Water enters as liquid and leaves as vapor. The rates of the two processes, wetting and drying, are widely different in any case and the more so if the solid masonry materials have low porosity. In a wall of fairly porous materials with no openings between them, the difference between the rates of wetting and drying of the wall is minimized.

5. An excessive amount of water in a wall is always damaging. Efflorescence and wet interior walls are symptomatic of this condition. The condition may exist without these symptoms. The freezing and thawing of water saturating a building material does far more damage than occurs when the same material is only partially saturated. The problem is not solved by selection of materials that may be highly frost resistant in a very wet wall. Immunity of the wall from oversaturation is the real objective. Frost resistance of materials in a wall that remains comparatively dry may be more or less superfluous. The fact that the masonry materials are frost resistant in a wall that is excessively saturated again and again is no comfort to the occupants of the building or to its owner.

6. The weakest points of masonry are open spaces, i.e., open joints, and areas where units and mortar meet but are not attached to one another.

7. To be "watertight," a wall must first of all have integrity. All joints must be filled completely with mortar and wherever building units and mortar meet, they must be firmly and permanently attached.

8. To adhere uniformly and well to building units, it is necessary that mortar be of the type that spreads easily, uniformly and well when it is applied.

9. If the adhesion (bond) of mortar to masonry units is only in spots, the wall lacks its fullest strength and is accessible to rain, regardless of the strength and imperviousness of the separate materials, building units and mortar. Strength of materials is no guarantee of strength of brickwork. Imperviousness of materials is no guarantee of dry walls of unit masonry.

10. If the extent or distribution of adhesion (bond) is poor, the adhesion or bond lacks resistance to differential volume changes and to the freezing and thawing of water that collects in the wall. Such poor adhesion is not likely to be permanent even with normal wall exposure, a condition that will not usually obtain since the openings admit water too freely. When complete failure of the bond (initially poor) takes place, the tensile strength of the brickwork is zero.

11. Building units vary with respect to the rate at which they absorb water.

12. Freshly mixed mortars vary with respect to the rate at which they lose water to a porous building unit with which they are in contact. Some mortars retain water when on a porous base much more than other mortars.

13. A proper balance between the two physical processes, the rate of receiving moisture from the freshly mixed mortar by the building unit and the rate of loss of water by the freshly mixed mortar, is necessary if intimate contact between the two materials is to be obtained.

14. Given a fair degree of mortar strength, then from the standpoint of masonry strength, the intensity of adhesion (bond strength) between the mortar and units should be at least equal to the tensile strength of the mortar.

15. From the standpoint of watertightness of the wall, the intensity of adhesion of mortar to units can never be too high (regardless of the mortar strength).

16. The pressure of units on the mortar bed while the mortar is workable, at least to some extent, helps to get intimacy of contact between bricks and bed joints. A too rapid rate of stiffening through water loss by mortar to the unit or through hardening of the mortar by cementing action or because of both processes, offsets more or less this natural tendency toward improvement of contact by superimposed weight.

17. The general absence of lateral pressure in vertical joints makes these localities especially vulnerable.

18. The more workable the mortar, the more it tends to slump from the mortar bed into any unfilled vertical joints.

19. The more workable the mortar, the greater is its tendency under any pressure whatsoever to fill the depressions and interstices on the surface of a brick or other building unit of rough texture. Poorly workable mortars tend to bridge across such grooves or depressions on the surface of the unit. Water can run under the "bridges."

ALTHOUGH these facts are elementary, by and large, proper use of them has not been made. They have been included, more or less, in various technical publications which, because of their technical phraseology and masses of tabulated data, have left the reader more wearied than enlightened.

A quantitative study of these simple facts leads to some new concepts involving the use of new terms. These will be considered in detail. The first of these is the water retaining capacity of mortars.

Figure 1

Mortar of high strength and low porosity is no guarantee of either strong or watertight masonry. This is a typical result obtained with a mortar deficient in water-retaining capacity on a dry porous brick.

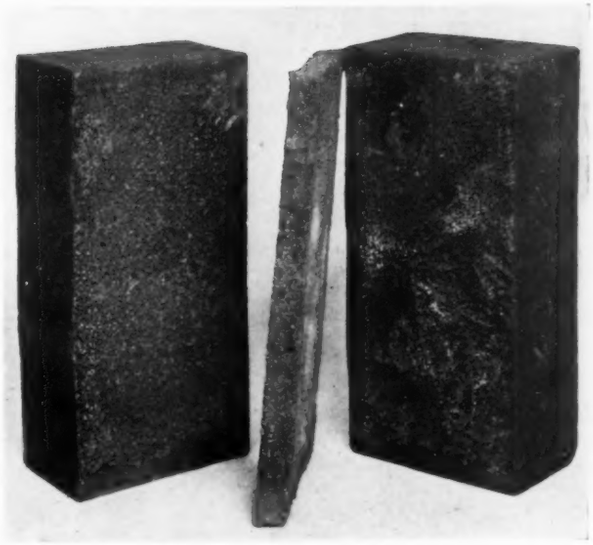
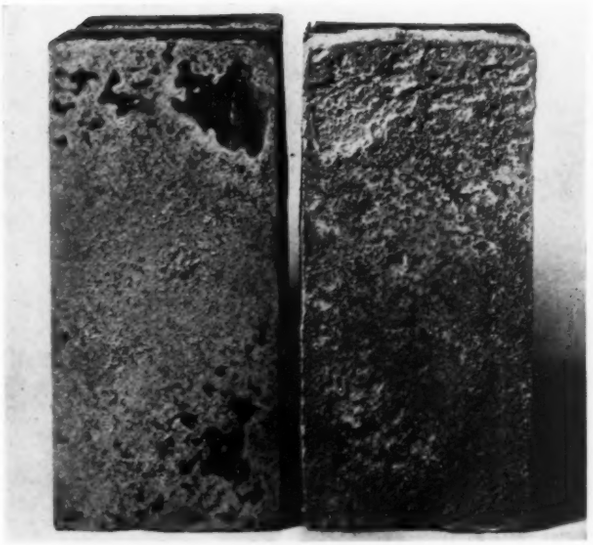


Figure 2

The destructive effect of volume changes subsequent to hardening when the extent of adhesion is incomplete. During storage, bricks and mortars separated. The mortar, deficient in water-retaining capacity, segregated when spread on porous bricks that were thoroughly wetted before being laid.



WATER RETAINING CAPACITY

This is the measurable resistance of a mortar to loss of water by filtration. Certain mortars when first spread on dry porous units stiffen far more rapidly than others. Certain modified natural cements and eminently hydraulic limes have high water retaining capacity. Other materials, similarly designated, are as noticeably deficient in this property as a mortar containing only portland cement and sand. High water retaining capacity is an outstanding characteristic of lime and rich in lime mortars. Present day specifications take no cognizance of the existence of this very necessary mortar property.

Figure 1 illustrates the poor extent or distribution of adhesion obtained with a dry porous brick and a mortar deficient in water retaining capacity. Figure 2 shows that wetting such a brick by total immersion in water for 15 minutes does not always overcome the difficulty when such a mortar is used. Mortars of low water retaining capacity tend to undergo segregation on an impervious base, e.g., when on the mortar board, on a saturated porous brick or on a dense impervious one. Puddles form, some portions of the mortar bed (supplying water to the puddles) becoming over-stiff. Neither the puddles nor the over-stiff areas bond well. Unbonded areas on the undersurface of the brick atop the mortar bed are seen in Figure 2. The bricks were set wet in this case but on account of segregation in the mortar, the distribution of bond was initially poor and later, volume changes occurring in the hardened mortar caused complete separation of the bricks at the plane where bricks and mortar met.

With most dry-press and other fast absorbing bricks set dry, a mortar of low water retaining capacity stiffens and loses practically all of its workability in less than 30 seconds. Hardening through cementing action is not begun by that time. The rapid stiffening through water loss is attended by a marked diminution in volume called *compacting on a porous base*. In vertical joints, such compacting draws the mortar away from the bricks and openings result. Compacting on a porous base must not be confused with shrinkage attending hardening through cementing action. The first is unidirectional, very rapid and is finished before the second begins. Mortars which compact most on a porous base shrink least during hardening and conversely. Openings in joints are seldom caused by shrinkage during early hardening.

TABLE 1: AVERAGE BONDING EFFICIENCIES, BOND STRENGTHS, TRANSVERSE STRENGTHS OF MORTARS AND WALL PERMEABILITIES. Bricks laid dry in all brick-mortar assemblages. The test procedures are described in detail in No. 9 and No. 10 of the list of publications on page 377 of this article.

Mortar mixture, proportions by volume of Lime (L), Portland Cement (P.C.), Masonry Cement (M.C.) and Sand (S)	Mortar No.	Average transverse strength of three months old 1 by 4 by 12 inch mortar slabs. lb./in²	Average tensile bond strength of three month old brick-mortar specimens. Cured same as mortar slabs. lb/in²	Bonding efficiency, values of third column divided by those of fourth column and multiplied by 100 Per cent	Average maximum rate of leakage through 8-inch test walls of each mortar and the 5 different makes of bricks laid dry. Each test wall contained half-inch joints and 16 bricks (four courses). Milliters of water per minute
1 P. C.: 3 S.	1	472	48.1	10.2	not determined
0.15 L.: 1 P. C.: 3 S	2	646	45.0	7.0	329
1 L.: 1 P. C.: 6 S.	3	166	42.8	25.8	not determined
1 L.: 1 P. C.: 6 S.	4	149	37.3	25.0	149
1 M. C.: 3 S.	5	109	27.0	24.8	93
1 M. C.: 3 S.	6	172	14.6	8.5	101
1 M. C.: 3 S.	7	157	17.3	11.0	250
1 M. C.: 3 S.	8	184	21.9	11.9	308
1 M. C.: 3 S.	9	118	14.3	12.1	74
2 L.: 1 P. C.: 9 S.	10	118	31.0	26.3	127
3 L.: 1 P. C.: 12 S.	11	109	22.9	21.0	100

ADAPTABILITY OF MORTARS AND BRICKS

An adaptable mortar tends to provide good extent or distribution of adhesion (bond) with a diversity of building units, varying both in absorption rate and surface texture. An adaptable brick or other unit is one having an absorption rate such that it tends to afford good extent of bond with a diversity of mortars of varying water retaining capacities. The ideal condition is had if the brick and mortar are both adaptable but this would likely only be realized accidentally because of the wide variation in the absorption rates of individual bricks of a type, all taken from the same kiln. The best possibility is to use the most highly adaptable mortars available with whatever type of brick is selected. It is both extremely difficult and uneconomical to try to control the absorption rate of bricks by wetting them. The simpler and safer procedure is to use mortars of high water retaining capacity and not wet bricks of any kind. This can only be done with some sacrifice in mortar strength but, despite this, there will be in many cases an appreciable gain in *masonry strength* through better distribution of bond in the wall.

In Research Paper No. 683 of the National Bureau of Standards Journal of Research, it is shown that a brick of best adaptability (from the standpoint of both strength and extent of adhesion) absorbs, when dry, from 20 to 25 grams of water per 30 square inches of brick surface during the first minute of its contact with water. Considering mortars of all types, such a brick has the optimum rate of absorption. If the absorption rate of the brick exceeds 40 grams of water per minute through 30 square inches of its surface, then if it is to be used with mortars of low water-retaining capacity, its absorption must be reduced by wetting. Obviously it is impracticable to bring each individual porous building unit to within the optimum range by wetting it. Furthermore, over-wetting leads to difficulty since mortars of low water-retaining capacity under this condition tend to segregate and form water films and puddles at the surface of the mortar bed (see Figure 2).

Again, the so-called optimum rate of absorption varies to some extent with the speed of the mason's operations. With poorly adaptable mortars, any bricklayer will experience difficulty in getting a desired intimacy of contact both with bricks of very low and very high rates of absorption and with bricks of more intermediate types he will yet experience more or less difficulty, depending on the variability of the absorption rate among the individual bricks of a kind and his speed of operation. Many deplore excessive speed in bricklaying and yet a combination of either impervious or dry porous bricks together with a mortar of low water retaining capacity renders high speed necessary. The mortar bed must be covered by the next course of bricks before there is either segregation (with impervious bricks) or rapid stiffening (with dry porous bricks). No one can fully appreciate these difficulties until he himself has laid different bricks with different mortars.

A highly adaptable mortar is always one of very good workability and excellent troweling properties but beyond this, *it tends to maintain its "trowelability" after it is placed on bricks of any type.*

THE BONDING EFFICIENCY OF MORTARS

The ratio, tensile strength of brickwork to tensile strength of mortar, expressed as per cent, is the bonding efficiency of the mortar. The computed bonding efficiency varies relatively little with the type of brick used if the mortar is adaptable. This statement is made on the basis of *comparable data* obtained with various brick-mortar combinations.

The data of Table 1 include the average bonding efficiencies obtained with 11 different mortar mixtures and 5 different makes of brick all laid dry. The average bond strength values as obtained with each of these mortars as used with all of the 5 makes of brick are also included in this table. In the last column are values for the maximum rates of water penetration through 8-inch test walls of these same brick and mortar combinations.

A complete compendium of the data obtained during the last 3 years of the investigation at the National Bureau of Standards, Washington, D. C., will be supplied by that Bureau on request. The values of Table 1 are computed from these data.

The rates of absorption of the 5 different types of bricks considered in Table 1 were:

	Grams of Water Per 30 Sq. In. During the First Min.
Brick 1 (dry-press, surface clay)	117.3
Brick 2 (stiff-mud, side-cut, shale)	22.9
Brick 3 (" " ")	10.4
Brick 5 (fire clay, stiff-mud, side-cut)	1.5
Brick 6 (surface clay, stiff-mud, side-cut)	71.8

The range in absorption rates included both extremes, low and high, as well as intermediate types.

Bonding efficiency, as here defined, depends chiefly upon three things, the extent and the intensity of adhesion and the tensile strength of the mortar. It is assumed that the mortar slabs, tested in transverse, failed in tension.

The average tensile mortar strengths of mortars 3 and 4 (Table 1) were higher than those of mortars 5 (1 M.C.:3 S), 10 (2 L:1 P.C: 9 S) and 11 (3 L:1 P.C: 12 S) but the extent of bond obtained with mortars 5, 10 and 11 was practically ideal and much better than that characteristic of mortars 3 and 4 when laid with dry bricks of No. 1 type. Two of the masonry cement mortars (mortars 6 and 9) have good records from the standpoint of wall permeability, but they had relatively low bonding efficiencies (fifth column, Table 1). This was due to their relatively low intensity of adhesion as indicated by their low bond strengths (fourth column, Table 1) as compared to their transverse strengths (third column). The extent of bond obtained with these two mortars was good and this accounts for their contribution to watertightness (last column, Table 1). However with mortars 6 and 9 (Table 1) failure in tension was invariably at the plane where brick and mortar met. In other words these mortars had poor bonding power (adhesiveness).

The bonding power of mortars 5, 10 and 11 was such that failure in tension was usually within the mortar. In these three mortars the conditions, good bonding efficiency, exceptionally high bonding power and fairly good tensile strength of brickwork, were combined.

Mortars of types 5, 10 and 11 are considered as superior to any of the other 11 mortars of that table. They produce good masonry strength and wall integrity. Due to the great severity of the permeability tests, it is believed that any brick-mortar combination transmitting an average maximum of 130 milliters of water per minute or less would be watertight for all practical purposes were it an integral part of an 8-inch wall. The *ideal combination* of masonry strength and watertightness is more closely approached by mortars 5, 10 and 11 than by any of the others of Table 1.

MINIMUM TENSILE STRENGTH OF BRICKWORK OBTAINED WITH A MORTAR

When mortars are bonded to different makes of bricks having different absorption rates, a tabulation of the average minimum tensile strengths of the brickwork for each brick and mortar combination helps to indicate the relative degrees of adaptability of the different mortars. It also indicates the most adaptable types of the bricks used. In Table 2, note the degree of variation in minimum bond strength values for the different mortars with the 6 different makes of brick and the corresponding degree of variation among the values as obtained with any one of the 6 bricks, bonded with the 11 different mortars. Considering "bond" as the attachment of brick to brick through the medium of an intervening mortar joint, then regardless of the location of the section of failure in the joint, it is bond strength that is measured. The absolute values of Table 1 must be considered as well as their variation with one mortar. Thus the bond strength with mortar 10 (2 L:1 P.C.: 9 S) and brick 1 was about the same as that of mortar 4 (1 L:1 P.C.: 6 S) with this brick, due to a better extent of bond in the former than in the latter case. Had it not been for this fact, the bond strength would have been considerably higher for mortar 4 (of higher strength) than for mortar 10 with brick 1. The minimum bond strengths of the 1:1:6 mortars (3 and 4, Table 2) with bricks 3 and 5 (low absorption) were about equal to that of the portland cement mortar (1) and these bricks.

The minimum values (Table 2) with brick 2 were obtained in all cases with this brick set wet. When dry it had the optimum rate of absorption. Brick 4 when dry absorbed about 59 grams of water per 30 square inches of surface during the first minute. The 11 mortars of Table 2 are the same as those of Table 1.

TABLE 2: MINIMUM VALUES FOR TENSILE BOND STRENGTH AS OBTAINED WITH EACH BRICK AND MORTAR.
Each value is an average of 6 tests.

Mortar mixture, proportions by volume	Mortar number	BRICK No. 1 lb./in²	No. 2 lb./in²	No. 3 lb./in²	No. 4* lb./in²	No. 5 lb./in²	No. 6 lb./in²	Adaptability of mortar
1 P. C.: 3 S.	1	0.4	56.1	45.4	38.5	26.5	0.8	poor
0.15 L.: 1 P. C.: 3 S.	2	0.2	72.7	51.5	67.5	32.3	16.1	poor
1 L.: 1 P. C.: 6 S.	3	26.3	34.9	52.2	37.1	22.8	35.0	fair
1 L.: 1 P. C.: 6 S.	4	23.2	27.4	40.4	33.6	26.4	21.3	fair
1 M. C.: 3 S.	5	15.9	16.9	39.0	30.9	9.4	27.9	good
1 M. C.: 3 S.	6	17.4	20.4	13.6	27.7	1.4	8.2	fair
1 M. C.: 3 S.	7	1.8	28.0	27.1	16.3	10.6	4.5	poor
1 M. C.: 3 S.	8	0.1	27.6	35.6	33.2	10.0	8.4	very poor
1 M. C.: 3 S.	9	2.7	8.7	14.3	5.5	1.2	6.5	fair
2 L.: 1 P. C.: 9 S.	10	22.6	27.5	32.8	28.5	12.1	24.0	good
3 L.: 1 P. C.: 12 S.	11	13.0	11.6	17.0	13.0	4.3	15.8	good
Adaptability of brick		poor	good	good	fair	poor	poor	

*Soft-mud, sand-struck brick, made from surface clay. Absorption rate, 59 grams of water per 30 sq. in. of brick surface during first minute.

TABLE 3: STRENGTH OF BRICK BEAMS (AGED 3 MONTHS) IN FLEXURE. Each value is an average of 3 tests. Bricks 1, 2, 4 and 6 laid wet (15 minutes total immersion) and bricks 3 and 5 laid dry.

Mortar mixture, proportions by volume	Mortar number	AVERAGE MODULUS OF RUPTURE WITH BRICK						
		No. 1	No. 2	No. 3	No. 4	No. 5	No. 6	
		lb. $1/in^2$	lb. $1/in^2$	lb. $1/in^2$	lb. $1/in^2$	lb. $1/in^2$	lb. $1/in^2$	
1 P. C.: 3 S.	1	52.0	208.0	39.4	100.7	18.2	0.0	Extent of bond poor. Some complete bond failures in storage due to volume changes subsequent to hardening.
0.15 L.: 1 P. C.: 3 S.	2	19.7	132.3	38.8	126.0	4.1	149.2	Ditto
1 L.: 1 P. C.: 6 S.	3	42.9	47.6	68.2	88.8	6.8	122.9	Extent of bond good in most cases.
1 L.: 1 P. C.: 6 S.	4	56.6	66.8	73.5	90.5	15.8	104.7	Ditto
1 M. C.: 3 S.	5	40.8	36.2	68.5	61.9	21.1	68.4	Ditto
1 M. C.: 3 S.	6	8.1	39.5	13.5	47.1	2.1	1.0	Volume changes subsequent to hardening destroyed the bond (initially poor) in some cases.
1 M. C.: 3 S.	7	19.9	42.1	33.2	34.4	3.2	18.2	Ditto
1 M. C.: 3 S.	8	0.0	66.8	36.6	7.1	3.2	1.0	Ditto
1 M. C.: 3 S.	9	2.9	11.9	14.8	16.1	0.6	18.3	Ditto
2 L.: 1 P. C.: 9 S.	10	45.1	42.0	39.9	83.4	10.4	88.7	Good extent of bond in all cases. No failures before test.
3 L.: 1 P. C.: 12 S.	11	29.8	24.2	30.4	35.0	15.2	42.1	Ditto

As previously mentioned, by working very rapidly, one can avoid having poor initial contact between bricks that absorb very little water and mortars that are deficient in water retaining capacity. By so doing, the mortar bed is covered with bricks before segregation takes place to an appreciable extent. This was the procedure in bonding together pairs of bricks for tension tests. However, in making brick beams, the time required to spread a joint of desired thickness (½ inch) was 15 or 20 seconds longer than that required in making two brick specimens and this additional time permitted noticeable segregation in mortars 1, 2, 7 and 8 to take place both with porous bricks laid wet and bricks of low porosity laid dry.

The minimum values for all mortars, except 5, 10 and 11 and porous bricks 1, 4 and 6, were obtained with these three makes of bricks set dry. For mortars 5, 10 and 11, the minimum values were obtained with these three bricks set wet.

The essential difference in bonding properties between brick 2 set wet and brick 5 set dry was in surface texture, the rates of absorption being nearly the same. Brick 5 was smooth and glassy whereas brick 2 was very rough. Bricks 2 (wet or dry) and 3 (dry) were the most adaptable of the 6 types studied and brick 2 laid dry was the most adaptable of all the bricks. Similarly, mortars 5, 10 and 11 were the most adaptable of the 11 mortars.

THE STRENGTH OF BRICK BEAMS IN FLEXURE

The flexural strengths of 3-months-old brick beams (5 bricks in single tier, set flat, 4 intervening mortar joints) comprising the 11 mortars and 6 bricks listed in Table 2, are given in Table 3. As already indicated, in making these beams, mortars of low water-retaining capacity tended to undergo segregation. Bricks 1, 2, 4 and 6 were wetted by total immersion for 15 minutes just before laying them in making the beams. Bricks 3 and 5, dense and impervious, were laid dry.

The low values (Table 3) obtained with mortars 1, 2 and 8, of high strength, with bricks that when laid had their suction greatly reduced by wetting, indicate that the wetting procedure does not satisfactorily solve the problem, getting good distribution of adhesion of mortar to bricks. The extremely low values were due to poor extent of bond (see Figure 2) which in some cases resulted in complete separation of the mortars from the bricks when later on, volume changes took place in the hardened mortars. It is definitely known that this separation occurred during the last two months of the aging period, during which time the beams were not moved or handled.

The most concordant results were obtained with mortars 3, 4, 5, 10 and 11 and particularly with 5, 10 and 11. These mortars had less tendency to segregate than any of the others of these 11 mortars. This tendency was greatest in the case of mortars 1, 2, 7 and 8 (less with 7 than the other three) and accounts for the poor extent of bond obtained with these mortars. Mortar 7 was characterized by low volume changes subsequent to hardening and although its distribution of bond was often poor, it did not tend to separate completely from the bricks during storage and prior to tests.

VOLUME CHANGES SUBSEQUENT TO HARDENING

One conclusion reached during the investigation is the following. If the extent of bond is initially complete or very nearly so, then volume changes subsequent to hardening are much more apt to crack the mortar joints transversely than they are to shear them loose from the bricks. If however the extent or distribution of bond is poor, such volume changes when relatively high (characteristic of dense cement mortars of high strength) will often cause complete separation of mortar and bricks, leaving the wall both

Figure 3
Change in volume of bricks when wet and dry is seldom as much as 0.01 per cent. Volume changes in hardened stucco are ordinarily 0.08 per cent or greater. Differential shrinkage and expansion caused this stucco to fall away from the brickwork.

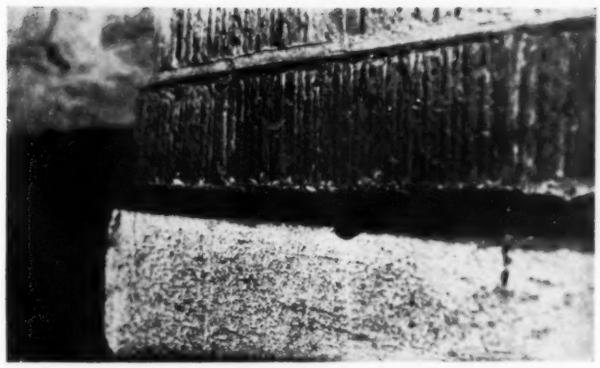


Figure 4. Dense cement mortar poorly adapted to dense impervious bricks. Water entering shrinkage cracks cannot subsequently evaporate through the dense solid materials.

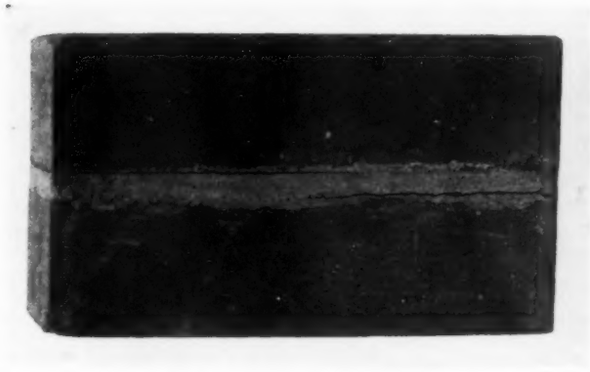


Figure 5. The bond of dense cement mortar to the porous bricks was initially poor in extent and later, volume changes in the hardened mortar caused complete bond destruction.

Figure 6. Water accumulated in this wall and froze, exerting forces that rival the power of dynamite. The effect of rapid wetting and slow drying.

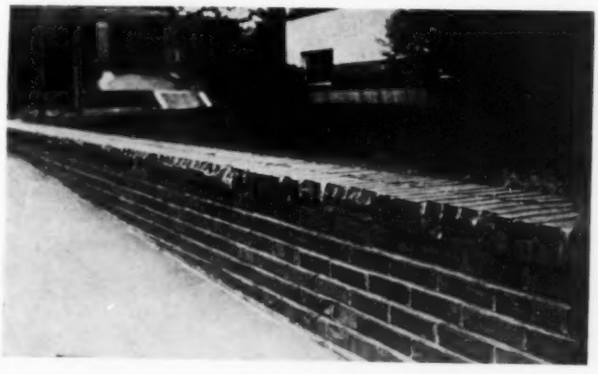


Figure 7. Dense impervious bricks, tooled joints of dense cement mortar, a very rapid rate of wetting (through cracks and open joints) and a very slow rate of drying all combined to keep this wall highly saturated.

weak and very accessible to the entrance of rain. A wall, wherein this condition exists, drys far more slowly than it accumulates moisture both before and after complete separation of mortar from bricks occurs, and from the beginning and throughout its life, the wall is subjected to the maximum severity of exposure to weathering agents.

Figure 3 illustrates the separation of stucco from a brick chimney. Volume changes in cement products are accelerated and magnified in chimneys. Figures 4 and 5 illustrate the separation of mortar joints from building units. Figures 6 and 7 show the effects of a slow drying rate of walls that are freely exposed to moisture. Since water could not exude sufficiently rapidly from the almost impervious surfaces, the walls became and remained highly saturated. The forces created by freezing this collected moisture rivals the power of dynamite. Professor H. Kreüger in "The Transactions of the Royal Swedish Institute for Scientific-Industrial Research, No. 24, 1933, Stockholm," and R. J. Schaffer in "The Weathering of Natural Building Stones," Special Report No. 18, 1932 of the British Building Research Station, have both stressed the necessity of avoiding the use of dense cement mortar for pointing for the reason indicated. Kreüger discusses at length the disastrous effect of volume changes in hardened cement surfaces.

Figure 8 is the same as Figure 1 of National Bureau of Standards Research Paper No. 683. As lime is substituted more and more for portland cement, volume changes subsequent to hardening as caused by variations in the moisture content, are decreased.

ASSOCIATED MORTAR PROPERTIES

It is both fortunate and unfortunate that certain mortar properties are associated. For instance it is unfortunate that outstanding hydraulic properties and

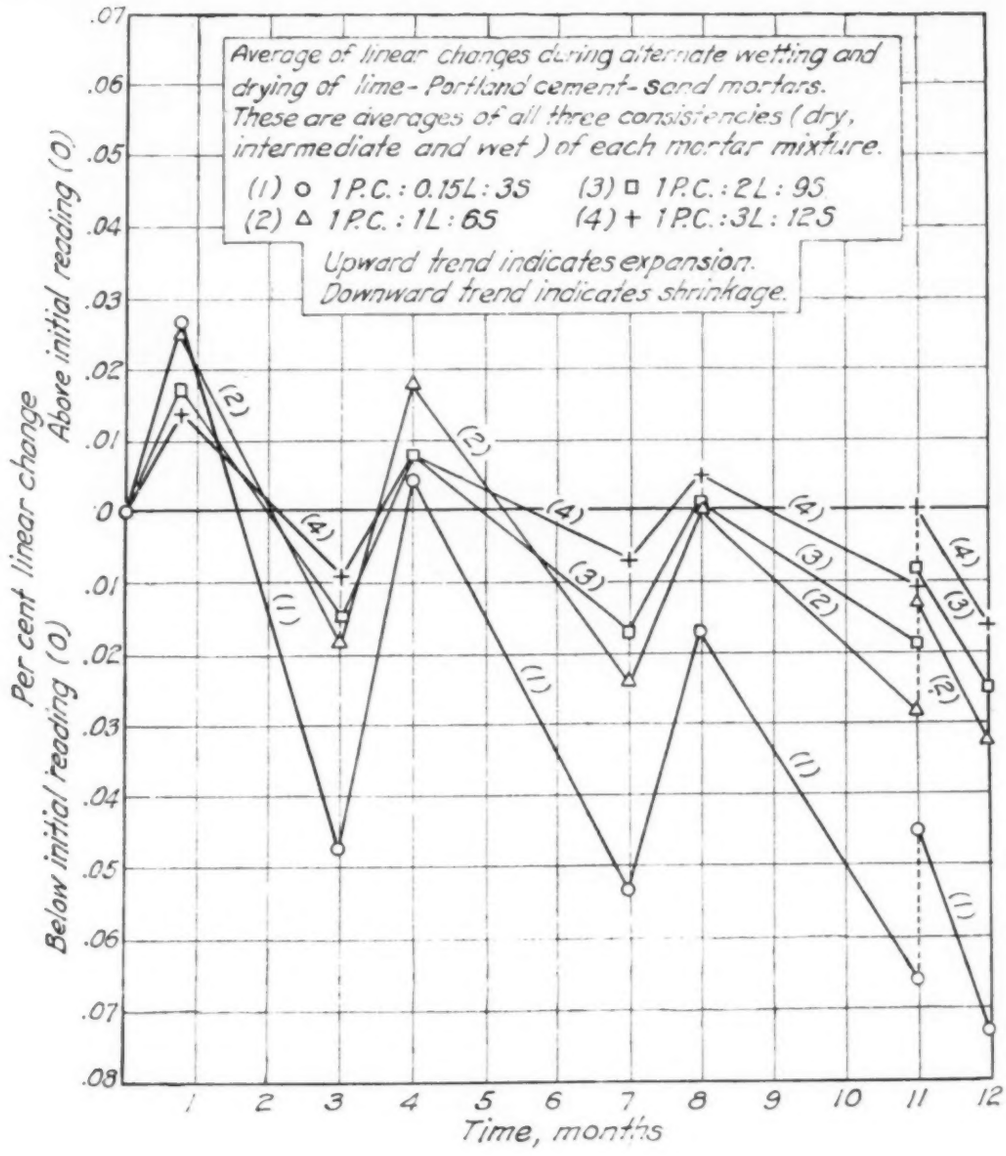


Figure 8
As lime is substituted more and more for portland cement, volume changes subsequent to hardening of the mortar decreased correspondingly.

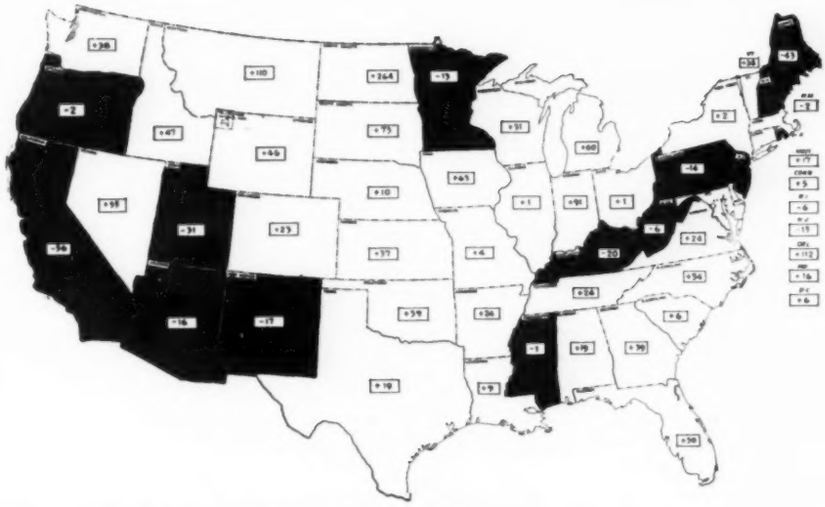
high strength are usually associated with low water retaining capacity and high volume changes subsequent to hardening. On the other hand it is very fortunate that the properties, high water retaining capacity, adaptability, bonding power and low volume changes subsequent to hardening are usually associated. The resultant effect of this combination of desirable mortar properties is bonding efficiency. It must be borne in mind that these necessary mortar properties are usually associated with only relatively low to medium mortar strength. However, as the data of Tables 1, 2 and 3 show, good masonry strength is obtained under these conditions whereas, owing to poor adaptability, mortars of high strength often afford weak masonry. The first consideration in the matter of masonry strength is wall integrity. Especially is this true for masonry construction in earthquake districts. To many, the fact that weak masonry may be had with materials which in themselves have high strength may seem a paradox. However, with the diversity of types of building units as used today, there is no doubt that this condition exists and hence mortar adaptability is highly important.

The selection of adaptable mortars involves some sacrifice in mortar strength, without necessarily sacrificing masonry strength. Often the latter is increased, as we have seen. Usually, the greater the sacrifice in mortar strength, the more enhanced are the properties, low volume changes after hardening, high water retaining capacity, workability and adhesiveness. With continued sacrifice of mortar strength the point is of course reached where the masonry strength is reduced.

For all ordinary brickwork, the masonry strength obtained with a mortar made with 2 volumes of lime (dry hydrate or stiff putty) to each volume of portland cement and 9 volumes of sand, is eminently satisfactory. If greater masonry strength is desired, it is preferable to reduce the amount of sand from 9 to 7 or 8 volumes retaining the 2:1 volume proportion, lime to cement. A 2 lime: 1 portland cement: 9 sand mortar hardens quickly enough to meet all demands of modern construction. It is far more workable and adaptable than the 1:1:6 mix, which is preferred for brickwork below grade. The use of the 2:1:9 mortar mixture or any other mortar having the same properties will go far toward providing watertight walls.

BUILDING TRENDS AND OUTLOOK

BY L. SETH SCHNITMAN
CHIEF STATISTICIAN
F. W. DODGE CORPORATION



BUILDING DURING 12 MONTHS — October, 1933-September, 1934, INCLUSIVE. Corresponding twelve months ended September, 1933, taken as base. SHADED AREA: BELOW BASE. UNSHADED AREA: ABOVE BASE. Figures denote percentage change from base. Floor space for new building contracts, 37 states east of the Rocky Mountains. Permit valuations for Rocky Mountain and Pacific coast states. Map, copyright American Map Co., N. Y. Authorized reproduction No. 5025.

RESIDENTIAL BUILDING SLIDES FURTHER

The volume of new construction projects started in the 37 Eastern States during September amounted to $110,219,200, according to the contract records of F. W. Dodge Corporation. This total represents a loss of more than 8 per cent when compared with the August volume of $120,014,600 and approximately the same percentage decline from the September 1933 total of $120,134,400.

An examination of the construction classes indicates no pronounced decline in any specific type of building. Residential building contracts awarded during the month totaled $17,871,600, as compared with $18,641,000 for August and $21,549,000 for September of last year. Nonresidentail building during the month amounted to $42,359,300, as contrasted with $50,816,900 for the preceding month and $37,836,300 for the corresponding month of last year. Public works, with increased highway work, showed an actual increase over August, the totals amounting to $43,478,500 and $41,905,900, respectively.

The cumulative totals for the first nine months of this year in each of the 10 major classes of construction show material gains when compared with the corresponding period of last year. In fact, the cumulative total for all types of construction, amounting to $1,203,952,100, is almost equal to the total for the entire year 1933 and exceeds the nine months' total of last year by more than 62 per cent. Nonresidential building with a total amounting to $432,259,200 shows a gain of more than 46 per cent over the corresponding 1933 total of $294,921,000. The public works total for the year to date is more than twice the total for the corresponding nine months of last year with contracts amounting to $491,444,400 and $210,420,600, respectively. Gains of this year over last year amounted to more than 66 per cent in the public utilities classification and to more than 4 per cent for residential building.

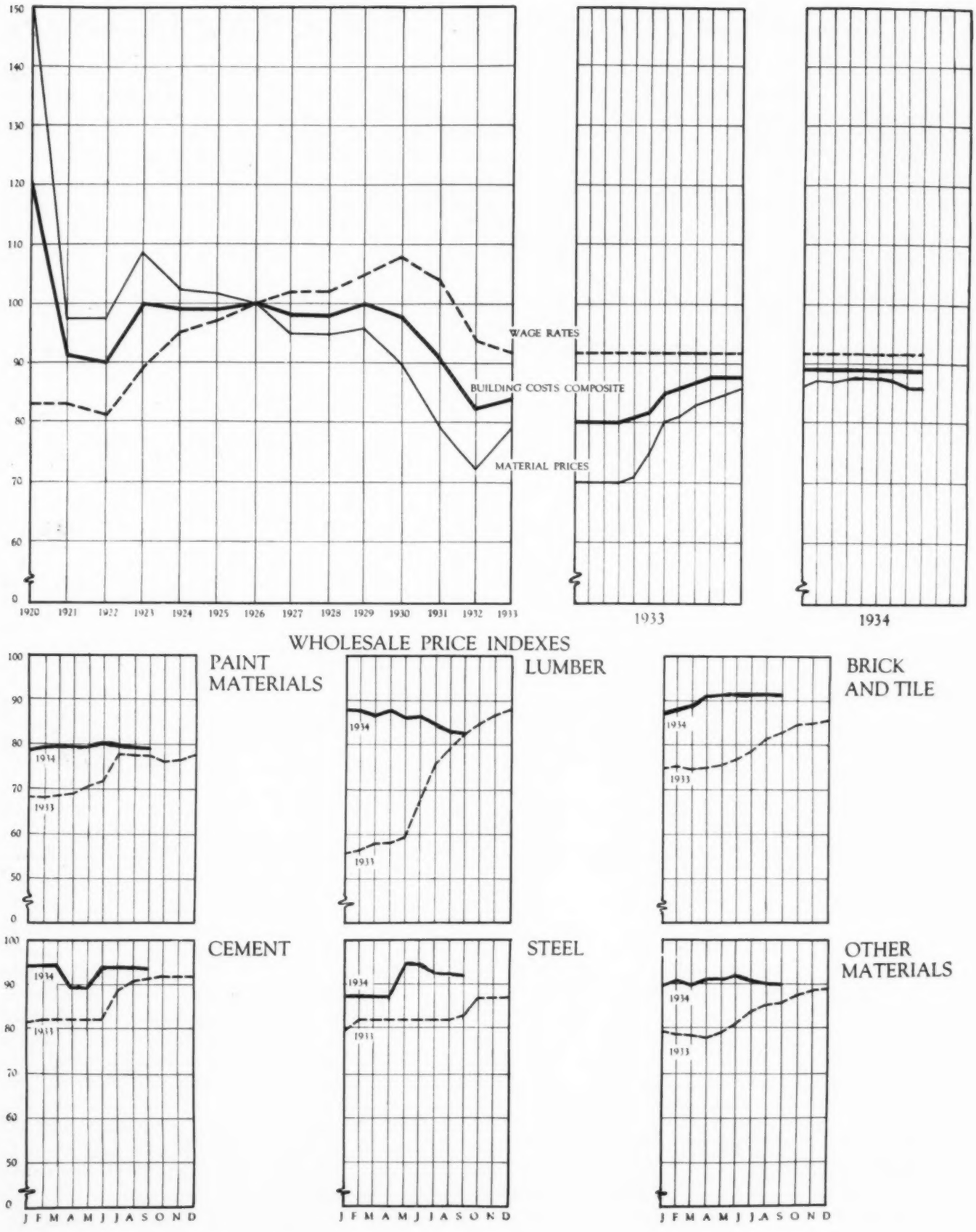
Contracts for alterations and additions to all classes of structures have doubled in volume this year as compared with last year. For the 37 Eastern States the amount of such work recorded in the first nine months of this year was $277,878,300, compared with $139,418,000 for the corresponding period of 1933.

MATERIAL PRICE MEASURING ROD

F. W. DODGE CORPORATION
COMPOSITE PRICES

MATERIAL	This Month	Month Ago	Year Ago
Portland Cement . .	$2.25	$2.25	$2.14
Common Brick	14.90	14.94	12.79
Structural Steel . .	1.65	1.65	1.60
Lumber	16.30	16.30	16.30

The prices in this tabulation enable one to visualize at a glance the main trend of the material market. Their significance does not extend beyond that point, and the explanation should be read carefully. Prices given in this comparison are composite and do not in all cases refer to one item. For instance, the price of structural steel is the composite of prices of shapes and plates f.o.b. Pittsburgh; the price of lumber is a composite of five items of Southern pine and five items of Douglas fir f.o.b. mill; the price of cement is a composite of prices in fourteen different cities per barrel, carload lots, to contractors; price of brick is composite in fourteen cities per M. delivered on the job. °Revised.



MATERIAL PRICES, BUILDING WAGE RATES AND BUILDING COSTS COMPARED

NATIONAL COPPER-STEEL RUST-RESISTING PIPE

No matter what type of building, the modern architect and engineer look to the durability of the equipment to hold down maintenance costs. Pipe, especially, plays an important part when not only repairs or replacements, but also possible interruptions to service are considered. This is why NATIONAL Copper-Steel Pipe is being increasingly used for soil, waste, vent lines, rain leaders, and steam returns in the modern industrial building. Those responsible know that copper-steel pipe lasts longer where atmospheric corrosion or certain alternate wet and dry conditons prevail. Numerous tests and extensive installations by leading users the country over have again and again confirmed this fact. And remember, you don't have to pay a high premium for copper-steel—just a trifle over regular pipe; yet you are assured of rust resistance not surpassed by any ferrous material within a justifiable price range. Take advantage of this economy and specify NATIONAL—*The Original Copper-Steel Pipe* (Made since 1911).

LOOK FOR THE GREEN COLOR—National Copper-Steel Pipe is marked as follows: Black Pipe—Smaller sizes colored green. Larger sizes, two green stripes running lengthwise. Galvanized Pipe—All sizes, two green stripes running lengthwise.

NATIONAL TUBE COMPANY · Pittsburgh, Pa.

Subsidiary of United States Steel Corporation

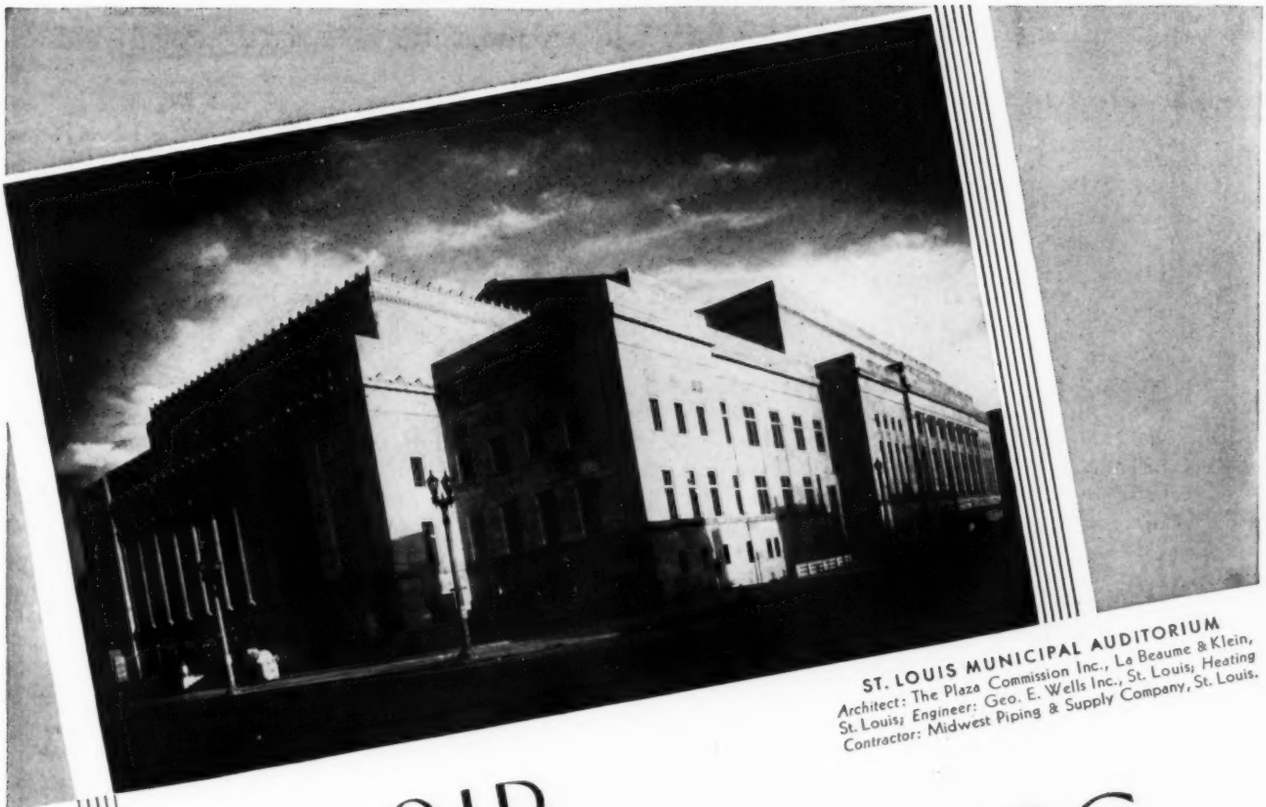
WAGE SCALES IN THE BUILDING TRADES

Information Furnished by National Association of Builders Exchanges and Compiled by Division of Statistics and Research, F. W. Dodge Corporation, as of September, 15, 1934

	Asbestos Workers	Bricklayers	Bricklayers Tenders	Carpenters	Cement Finishers	Electricians	Hoisting Engineers	Iron Workers—Ornamental	Iron Workers—Structural	Laborers	Lathers	Painters	Plasterers	Plasterers' Tenders	Plumbers	Roofers—Composition	Roofers—Slate & Tile	Sheet Metal Workers	Steamfitters	Stone Masons	Tile Setters	Tile Setters' Helpers
Akron	$1.00	$1.25	$0.45	$0.70	$0.70	$0.75	$0.70	$0.60	$0.60	$0.40	*$0.87½	$0.65	*$1.00	$0.62½	$0.85	$0.80	$0.80	$0.80	$0.85	*$1.25	*$1.25	*$0.50
Atlanta	1.00	1.25 1.40	‡.30 .45	.70	1.25	.90 1.10	.60 1.00	.35 1.85	1.25	.25 .35	1.00 1.25	.75	1.25	.30 .45	1.25	.80	.80	.90 1.00	1.25	1.00 1.25	1.25	.40
Baltimore	1.00	*1.10	1.10	1.00	*1.00	*1.00	*1.50	*1.37½	*1.37½	.40	*1.25	1.00	*1.25		*1.10	.75	.75	*1.12½	*1.10	1.10	1.25	65
Boston	1.25	*1.30	.70	*1.17½	1.17½	*1.25	1.17½	*1.20	*1.20	.70	*1.50	*1.12¼	1.37½	*.95	*1.25	*1.17½	*1.05	1.17½	*1.25	*1.30	*1.30	*.95
Buffalo	1.00	*1.25		*1.00	1.00	1.12½	1.00	1.12½	1.12½	.40 .50	1.25	*1.00	1.00		1.20	.60	1.00	1.00	*1.20	*1.25	*1.18¾	
Chicago	1.37½	1.50	.82½	*1.37½	1.37½	1.50	1.37½	1.33⅓	1.35	.82½	*1.50	1.33⅓	*1.50	88¼	1.37½	1.37½	1.50	1.37½	1.37½	1.50	1.50	1.06¼
Cincinnati*	1.15	1.37½	.70	1.20	1.02½	1.25	.80 1.25	1.25	1.25	.45	1.31¼	1.15	1.37½	.70	1.25	1.02½	1.07½	1.07½	1.12½	1.25	1.00	
Cleveland*	1.17½	1.25		1.12½	1.12½	1.37½	1.12½	1.25	1.25	.72½	1.25	1.20	1.25		1.25	1.15	1.37½	1.12½	1.25		1.25	.81¼
Columbus	1.00	1.30	.62½	.80	.80	1.00	1.15	1.25	1.25	.40	1.00	.80	1.00	.62½	1 00	.80	1.00	.80	1.00	.75	1.25	.50
Dayton*	1.25	1.30	.80	1.00	1.15	1.55	1.25	1.35	.50	.50	1.10	1.00	1.20	.80	1.00	.85	1.00	1.00	1.00	1.30		
Denver††	9.00	12.00 *13.00	6.50 7.00	10.00	10.00 11.00	10.00 11.00	10.00	10.00 11.00	10.00 11.00	4.00 5.00	11.00	*10.00	12.00	7.00	11.00	7 00 8.00	7.00 8.00	9.00	9.50	12.00 13.00	10.50	†.62½
Des Moines	1.00	1.25	.67½	1.00	1.00	1.00	1.00	1.00	1.20	.55	1.00	1.25	1.25	.67½	1.00	1.00	.87½	.87½	1.00	1.25	1.25	.67½
Detroit	1.37½	1.25 max.	.55 .60	.80 1.00	.70 .90	1.25 1.40	.60 1.00	1.00 1.20	1.00 1.25	.50 .55	1.37½	.80 1.00	1.00 1.25	.70 .80	1.00 1.50	.70 .90	.80 1.00	.80 1.00	1.25 1.50	1.25 1.50	1.00 1.25	.80
Duluth	1.00	1.00	.50	.80	.80	1.00	.80		1.00	.50	.80	.80	1.00	.70	1.00	.70	1.00	.85	1.00	1.00	1.00	1.00
Erie		1.00	.45 .50	.80	.80	.90 *1.00	.90	.60 .80	.90	.40	.90	.60 .70	1.00	.40 .50	1.00	.50 .60	.80 .90	.80 .90	*1.00	1.00	.80	.40 .50
Houston		1.00	.35	.75	.75	1.00	.75	1.00	1.00	35		.62½	1.00	.35	1.00	.75	1.00		1.00	1.00	1,00	
Indianapolis	1.62½	1.62½	.90	1.22½	1.17½	1.50	1.37½	1.45	1.45	.40 .45	1.37½	1.25	1.57½	1.00	1.00	.60 .90	1.27½	1.22½	1.50	1.62½	1.50	.60
Kansas City	90	1.32½	.80	1.00	1.00	1.00	1.00	1.00	1.00	.60	1.00	1.00	1.06¼	.80	1.00	.92½	.92½	1.00	1.00	1.12½	1.25	.62½
Los Angeles††	10.00	8.00	6.00	7.00	8.00	7.00	8.00	9.00	10.00	4.00	10.00	7.00	9.00	6.00	9.00	7.00	7.00	8.00	10.00	8.00	6.00	†.75
Louisville	1.00	1.25	.62½	1.00	1.00	1.00	1.00	1.00	1.00	.40	1.12½	.95	1.00	.62½	1.12½	.40	.85	.85	1.12½	1.25	1.00	
Memphis	1.00	1.37½	.50	.87½	1.10	1.00	1.12½	.87½	.87½	.40	1.00	1.00	1.25	.50	1.25	.75 1.00	1.12½	1.12½	*1.25	1.37½	1.25	.50
Milwaukee	1.00	1.00	.75	.92½	1.00	1.25	1.00	1.05	1.05	.60	1.00	1.00	1.00	.75	1.00	1.00	1.00	.92½	1.00	1.00	1.00	.65
Minneapolis	1.00	1.00		.80	80	1.00	.80	.90	1.00	.45	.75 .85	.80	1.00	.70	1.00	.70	.70	.80	1.00	1.10	1.00	.65
Nashville		1.00		.60 .75	.50	.75		.60	.75	.40	1.00	.62½	1.10		1.10	60	.60	.60	1.10	.50	.75	
New Haven*		1.20	.50 .60	.80 1.06¼	1.20	.80 1.00	1.16¾ 1.27½	1.37½	1.37½	45 .65	1.27½	.80 1.00	1.20	.50 .60	1.06¼		1.50	1.06¼	1.06¾	1.20	1.20	
New Orleans	.65 .80	1.25	.85	.55 .75	1.00	1.25	1.25	1.25	1.25	.35 .50	1.25	.75 .90	1.25	.75	1.00 1.25	.40	.90 1.15	.90	1.05 1.25	1.50	1.25	.35
New York City††	11.20	12.00	7.20	11.20	c11.20	11.20	13.20	11.20		6.60	11.20	9.00	12.00	8.50	c12.00	10.28	12.62	11.20	11.20	12.00	11.50	8.50
Oakland††	6.40	10.00	5.60	7.20	8.00	8.00	11.00	7.20	11.00	5.00	8.00	7.00	7.50	6.00†	8 80	6.40	6.40	8.00	9.00	9.00	8.00	5.00
Oklahoma City††	8.00	8.00	4.00	6.00 8.00	8.00	6.00 8.00	8.00	8.00	8.00	3.50	†.80	7.00 8.00	†.80	4.00	†.80	6.00	6.00	8.00			11.00	†.62½
Omaha	1.32½	1.12½	.45	.90	1.00	1.00	1.00	.90	.90	.50	.90	.80	1.20	.80	1.20	.72½	.95	1.00	1.20	.90	1.00	.50 .60
Philadelphia	1.00	1.50		1.00	1.05	1.25	1.18½	1.25 1.37½	1.00 1.37½	.40	1.37½	.90	*1.37½		1.20	1.00	1.25	1.25	1.20	1.25	1.12	.75
Pittsburgh	*1.50	*1.50		*1.25		*1.56¼	1.37½ 1.43¾	*1.37½	1.37½	70	*1.50	.87½	*1.50		1.50	*1.25	*1.50	*1.31¼	*1.50	*1.40	1.33⅓	.88
Portland, Ore.††	8.00	*9.60	7.20	7.20	*7.20	*8.00	6.40 9.60	6.80	8.80	4.80	*8.80	7.04	*9.60	*7.20	*8.80	7.20	7.20	*8.00	*8.80	*9.60	8.00	7.20
Reading	.80	.80	.60	.80	.80	.80	.80	.80	.90	.40	.90	.63	.90	.60	.90	.80	.80	.70	.90	.70	.75-1.15	.50
Richmond	.60 .65	1.25		.60	.35 .40	.80		.70	.70	.40	1.00	60	.60		.90	.60	.60	1.00	90	1.25	1.25	
Rochester	.91	1.25	.55	1.05	*1.25	*1.20	.90	.70-*1.00	.70-1.00	.55	.90	1.05	*1.25	.55	*1.20	*.95	*. 95	1.05	*1.20	*1.25	1.20	.47½
Salt Lake City ††		9.00	5.00	7.20	8.00	1.12½	1.12½	1.12½	1.12½	4.00	1.10 1.25	7.20	1.50	1.10	8.00	7.20	8.00	8.00	8.00	9.00	8.00	4.00
San Antonio††	6.00 10.00	6.00 10.00	2.00 3.00	2.00 7.00	3.00 8.00	3.00 7.00	4.00 7.00	1.75 4.50	5.00 10.00	1.50 2.50	4.00 7.00	3.00 7.00	4.00 8.00	2.00 3.00	5.00 8.00	5.00 6.00	4.00 6.00	3.00 7.00	5.00 8.00	3.50 8.00	4.00 10.00	2.00 3.00
San Francisco	6.40	9.00	7.00	7.20	7.20	9.00	9.00		9.60	5.00	8.00	7.00	8.80	7.50	8.00	8.00	8.00	7.20	8.00		8.00	5.00
Seattle††	8.00	9.60	5.28	7.20	7.20	*8.80	8.00	8.00	8.80	4.75	*8.80	7.20	*9.60	*6.40	*8.80	7.20	7.20	8.00	*8.80	9.60	8.00	
Sioux City	1.00	1.25	.50	1.00	.90	1.00	1.00	90	.90	.50	.90	1.00	1.25	.60-.65	1.20	.90	.90	.85	1.20	1.25	1.00	.60
St. Louis	1.25	1.50	.87½	1.25	1.31¼	1.50	1.35- 1.47	1.47	1.47	.78¾	1.25	1.25	1.50	1.06¼	1.43¾	1.17½	1.25	1.25	1.43¾	1.25	1.25	.76½
St. Paul	1.00	1.10	.55	.80-.90	.80	1.00	.80	1.00	1.00	.50	1.20	1.00	1.20	.85	1.20	.75	.75	.85	1.20	1.00	1.12½	
Washington, D.C.	*1.50	1.75	.50 .75	*1.37½	1.25	*1.65	*1.37½	*1.65	*1.65	.75	*1.62½	*1.37	*1.75	*.75	*1.50	*1.37½	*1.37½	*1.50	*1.50	*1.25	*1.50	.75
Wichita	.60	.75 1.25	.25 .40	.40 .75	.40 1.00	.50 .87½	.30 .75	.40 1.00	.40 1.00	.20 .40	.50 1.25	.50 .87½	.60 1.25	.25 .50	1.00	.50 1.00	.50 1.00	.50 1.00	.75 1.12½	.75 1.25	.50 1.00	25 .40
Youngstown††	*1.00	1.25	.60	.75-1.00	1.12½	1.00	1.12½	1.25	1.25	.40	1.00	1.00	1.25	.75	1.00	1.00	1.00	1.00	1.00	1.25	1.25	.81¼

NOTE.—Where two figures are shown they are the minimum and maximum. All figures are for hour rates except as indicated. ††8-hour day. ‡6-hour day. †Rate per hour. *On 5-day week basis. cCorrection. Asterisk after city indicates all trades on five-day week basis.

ABOVE DATA ARE WAGE SCALES AND DO NOT NECESSARILY INDICATE ACTUAL WAGE RATES BEING PAID IN THE RESPECTIVE TRADES.



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Architects are invited to use the coupon on this page as a convenient means of obtaining manufacturers' publications describing in detail the products and materials mentioned

L-1
LAYTEX, NEW INSULATION

United States Rubber Company has developed a flexible insulation said to be unique in tensile strength and resistance to compression, in flexibility, in dielectric strength. It permits thinner walls making possible finished conductors lighter in weight and smaller in bulk. Laytex is the material resulting from rubber processed to eliminate those elements—proteins, sugars and water solubles—which are susceptible to moisture and therefore non-insulating. According to the manufacturer, tests have demonstrated that Laytex has a stretch of 750 per cent and has a tensile strength of 5,000 pounds per square inch. Uniform wall thickness results from natural laws of physics operating in the manufacturing process whereby the film of insulation is coagulated directly onto a conductor from a liquid state. In addition to its electrical applications in building Laytex is expected to find wide use in various other industries.

L-2
CONCRETE BRIDGE DETAILS REVIEWED IN NEW BOOKLET

A critical discussion of concrete bridge details based on field observations is contained in a 48-page illustrated booklet, "Concrete Bridge Details," published by the Portland Cement Association. Among the subjects discussed are abutment movements; wingwalls; bridge seats; bearings; expansion joints; prevention of seepage; wearing surfaces; hand railings; construction of approach slabs; and creep in skew bridges. The purpose of the booklet is to improve construction of concrete bridges to achieve longest life with least cost of upkeep.

L-3
FLOOR MAINTENANCE SYSTEM

A system of impregnating wood floors with a seal then buffing with a machine that cleans, removes roughness, works the seal into the wood and polishes is announced by G. H. Tennant Company of Minneapolis. Without cleaning or scrubbing the floor the seal is applied with a mop. A few minutes after application the floor is buffed with the Tennant machine. In this manner the seal, worked into the floor by the special revolving wool roll in the machine, acts as preservative and polish. The system is said to be more economical than scrubbing and is entirely free from the damaging effects of soap and water applied to wood flooring. Daily sweeping with an oil-treated mop is sufficient for maintenance after buffing. Due to the facts that clean floors are known to be effective in reflecting light and that by the Tennant system wood floors can be cleaned without being damaged, several prominent architectural firms are said to indorse the use of the system for department stores, schools, offices and other buildings where foot traffic is heavy.

L-4
NEW OTIS PRODUCT

A new electric operator for car and hoistway doors is introduced by the Otis Elevator Company. Known as "Type O" it provides power operation for elevator car and hoistway doors and produces quiet, automatic door operation at moderate cost. The doors are power-opened and spring-closed, and are cushioned at the end of travel in either direction. The hoistway door is driven by the car door. Hoistway door locks and contacts act as true interlocks as defined by the American Standard Safety Code for Elevators.

L-5
GAR-WOOD PRODUCTS

Oil heat units and air conditioning equipment manufactured by Gar Wood Industries, Inc., are reviewed in a newly released catalogue. The general types of equipment include (1) Boiler-Burner unit, produced in four sizes for steam or hot water, consisting of a steam, down draft boiler designed integrally with its automatic oil burner; (2) Model "R" Boiler Burner Unit, produced in one size, it is a triple pass horizontal firetube steel boiler and automatic oil burner; (3) Tempered-Aire-Furnace, Burner, Filter, Blower Unit; (4) Indirect Air Conditioning Cabinet; (5) Conversion Oil Burner Units; (6) Automatic Oil Fired Water Heater.

An offer to architects practicing in United States

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about any products mentioned, write the index numbers in space below. For literature about products *advertised* in this issue, give name of the product and manufacturer. Return coupon to The Architectural Record, 119 West 40th Street, New York, N. Y.

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Uncle Sam puts a shoulder to the wheel

For five years, building owners have had to pinch pennies. For five years, buildings have been allowed to fall into a serious state of disrepair. Today, 16,000,000 properties need money spent on them to bring them back to usefulness, and to provide employment for the great building industry. • Uncle Sam has put his shoulder to the wheel—has passed the National Housing Act to provide the funds that should remove a long dark shadow from the road to prosperity. • Store fronts need remodeling—think of ENDURO, Republic's Perfected Stainless Steel. Homes need new gutters and downspouts—think of long-lasting Toncan Iron. Office buildings need air conditioning systems—think of Toncan Iron Sheets. Institutions need new kitchens—use ENDURO. Plumbing must be replaced—there's nothing to surpass Toncan Iron Pipe. Wherever new or repair work calls for ferrous metals—remember that somewhere in the line of Republic Steel Products you can always find a satisfactory answer to your problem. • Architects will find the counsel of a Republic representative helpful. A call involves no obligation—except our obligation to put our shoulder to the wheel and serve you.

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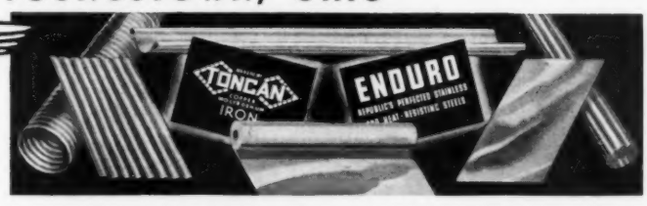


L-6
PRESSURE REGULATORS

A booklet, "Pressure Regulators and Regulation Problems," released by Air Production Sales Company, contains information of interest to those concerned with the problem of maintaining accurate, uniform pressure control and the close regulation of oxygen, acetylene and other gas pressures.

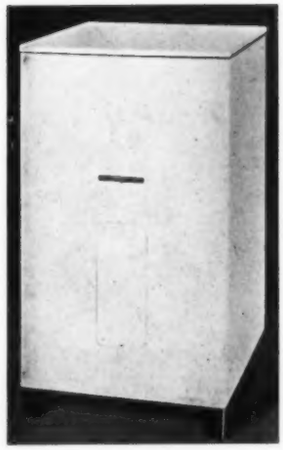
L-7
RED TOP WEATHERWOOD

A colorfully illustrated 30-page booklet is released by United States Gypsum Co., manufacturers of the insulating board, Red Top Weatherwood. The foreword to the booklet, quoted herewith, outlines the contents: "The purpose of this book is to show —largely by illustration—the use of Weatherwood Insulating Board and Tile as an interior finish. All illustration, while artistic and imaginative, is kept entirely within the practical. Designs are limited to standard-sized units and ready adaptations with available cutting tools. The thought is to present interiors that can be readily and economically reproduced in actual construction by any good mechanic. All drawings are the work of the eminent artist and designer, Henry Harringer."

L-8
COPPER TUBING

Copper tubing for water service is the subject of a booklet published by Bridgeport Brass Company. The conditions for which tubing of various copper and zinc content are recommended are described and illustrated. Claims are made and reasons advanced in their support which clarify the advantages of copper water tube in efficiency and length of service.

L-9
NEW WATER HEATER



A new automatic electric water heater, combining style and compactness with unusual capacity, has been announced by the specialty appliance sales department of General Electric Company. It is 36 inches in height. Though only 21 inches wide and 22½ inches deep, it has a capacity of 30 gallons. Occupying a minimum of space, it may be placed anywhere in the kitchen and its top, finished in white porcelain, may be used as a working surface. The tank, housed in a heavy rectangular steel case with baked white enamel finish, is Cop-r-loy all-electric welded and heavily dip galvanized, guaranteed for 300 lb. test pressure and 150 lb. working pressure. The Calrod self-cleaning immersion unit is mounted on a brass flange-type support and is furnished in nine sizes ranging from 500 to 3,000 watts. It is easily removed. Thermostat is adjustable from 130 to 200 degrees with factory setting of 150 to 155 degrees. Rock wool insulation has an average thickness of 3 inches. All plumbing connections are ¾ inch. A deflector to reduce the velocity of incoming water spreads cold water evenly across the bottom of the tank and reduces to a minimum mixing with the stored hot water. The GW30A1 heater is priced at $63, f.o.b. factory. It will be merchandised through the distributor-dealer organization of G-E's specialty appliance sales department.

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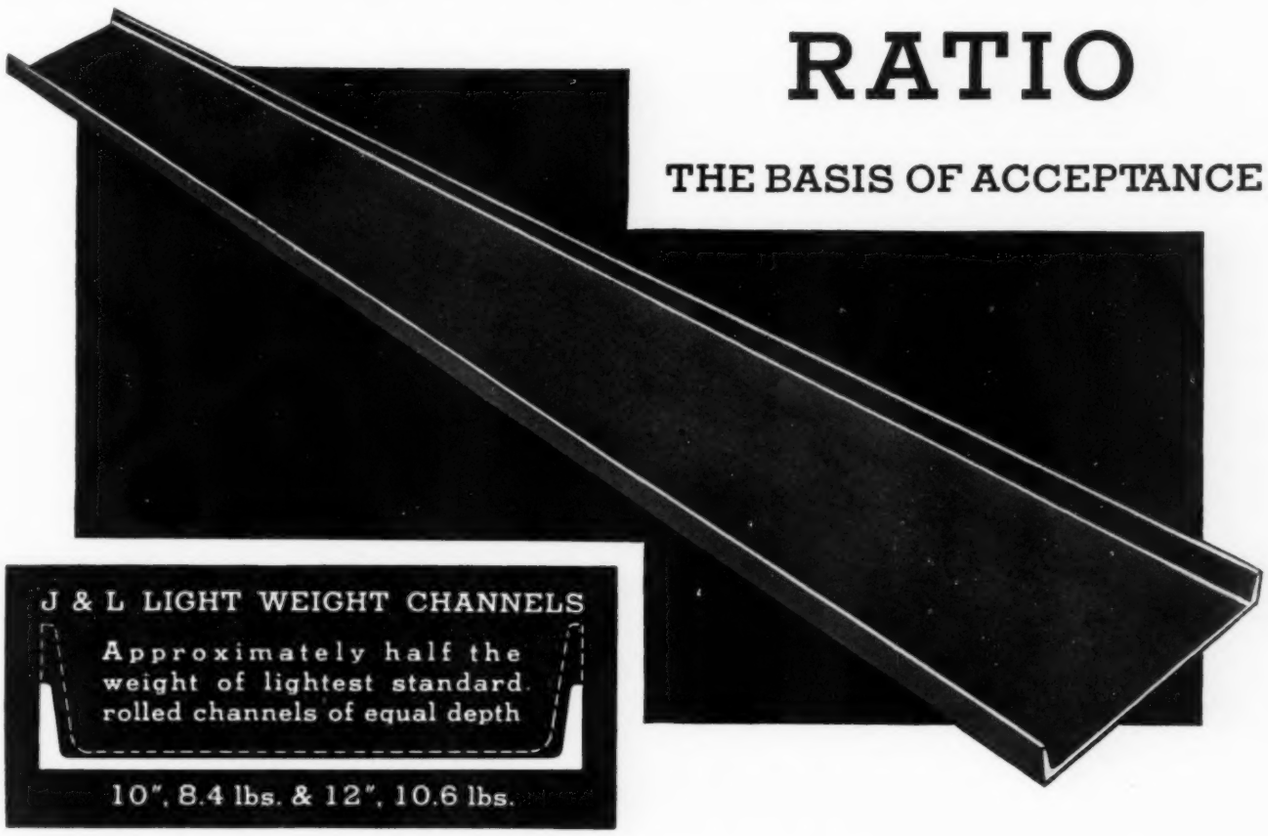
FAVORABLE STRENGTH-TO-WEIGHT RATIO

THE BASIS OF ACCEPTANCE


J & L LIGHT WEIGHT CHANNELS
Approximately half the weight of lightest standard rolled channels of equal depth
10", 8.4 lbs. & 12", 10.6 lbs.

J & L Light Weight Channels, used extensively for stair stringers, have greater strength than formed plates of equal depth. They are rolled steel sections, similar in type and with the strength characteristics of standard structural channels. They are about one-half the weight of the lightest standard rolled channels of equal depth.

In addition to the advantage in weight, **J&L** Light Weight Channels have straight, true lines and sharp corners, permitting a neat, well-finished appearance to the completed job. A minimum of shop equipment is required for fabrication, and installation is rapid.

These strong, economical channel sections are in use as stair stringers in all types of buildings. They are also adaptable to many other uses. Sizes: 10", 8.4 lbs., and 12", 10.6 lbs. Write for engineering data on **J & L** Light Weight Channels and learn their exact characteristics.

***J&L** Steel Construction Products: Light Weight Rolled Channels, Junior Beams, Steel Piling, Standard Structural Shapes, Bars for Concrete Reinforcement, Steel Pipe, Fabricated Structural Work including Steel Plate Construction*

J&L STEEL

JONES & LAUGHLIN STEEL CORPORATION
AMERICAN IRON AND STEEL WORKS
JONES & LAUGHLIN BUILDING, PITTSBURGH, PENNSYLVANIA

Sales Offices: Atlanta Boston Buffalo Chicago Cincinnati Cleveland Dallas Denver Detroit Erie Los Angeles Memphis Milwaukee Minneapolis New Orleans New York Philadelphia Pittsburgh St. Louis San Francisco
Warehouses: CHICAGO CINCINNATI DETROIT MEMPHIS NEW ORLEANS PITTSBURGH
Canadian Representatives: JONES & LAUGHLIN STEEL PRODUCTS COMPANY, Pittsburgh, Pa., U. S. A., and Toronto, Ont., Canada

1906

MODERN CATALOGING

Published Monthly by SWEET'S CATALOG SERVICE
Division of F. W. Dodge Corporation

1934

Volume 1 NOVEMBER, 1934 Number 6

BULLETIN BOARD

If all the 1934 Sweet's Catalog Files (Architectural) were piled, one on top of the other, the column of catalogs would be 10,000 feet high—eight times the height of the Empire State Building!

Standing on top of the pile on a clear day, an architect (oh yeah? Why not a statistician?) could see a distance of 127 miles.

Just like John D., who doesn't know how much he's worth, we can't tell you how many thousand items are described in Sweet's, but we'll give a bright new dime to any user of the Sweet's file who will count them up for us.

There must be quite a few, considering the fact that it took 123 pages merely to *index* them.

It's got us now. We can't stop!

If an architect read all the catalogs in Sweet's straight through at the rate of ten hours a day, it would take him three months to complete the job—which is only a lap or two ahead of Anthony Adverse.

Fifteen carloads of paper went into the making of the Sweet's file. But that's nothing compared with the paper wasted in lost catalogs before Sweet's was invented.

If thirteen thousand architects, engineers and contractors will each tell every salesman who calls that catalogs in Sweet's are consulted more frequently than others, a thousand manufacturers will order Sweet's to compile the finest file of complete catalogs ever seen this side of the Congressional Library.

After All These Years

WE WELCOME into Sweet's Catalog File for 1935 (and so will you, we believe) a number of manufacturers who will distribute their complete catalogs in this form for the first time. Some of them are old clients of Sweet's but until now they had not, for reasons best known to themselves, taken full advantage of the service.

These cases have a parallel in the situation of neighbors who after bowing pleasantly but formally to each other for years, finally become really acquainted.

We hope that our new friends will feel like exclaiming with us, "Where have you been all my life!"

When is a Catalog Complete?

FOR WANT of a more accurate term to use in differentiating between catalogs which hit only the high spots of information and those which include all essential data—the kind which, we hope, will ultimately predominate in the Sweet's file—we have for some time designated the latter as *complete* catalogs.

This compromise with precise expression will be overlooked by users of Sweet's who are familiar with our objective and can foresee the many practical advantages in its attainment. But there are others who, with a recollection of the massive tomes received from a few manufacturers, which they mistakenly regard as typical of complete catalogs, have expressed doubt that Sweet's can ever become a complete catalog file.

We would be willing to drop the discussion until such time that we could prove their error with the *fait accompli* if meanwhile, progress toward that goal were not being needlessly retarded just because of a varying interpretation of terms. Let it be understood then, that although the complete catalogs which some day will replace the many sketchy

bulletins in the Sweet's file may not include all that could possibly be said about every item a manufacturer makes, they will be especially designed to give architects all the information they need in the average case to make an intelligent selection from among the products under consideration.

Their completeness will not be measured by mere bulk. Some will be 8 pages and others 88—or even more. And whatever their size, manufacturers will pay less per copy filed than they would if they continued the old-fashioned wasteful individual distribution.

Locating Local Representatives

HUNDREDS of manufacturers, more than ever before, are including in their catalogs in Sweet's the names and addresses of their branch offices, sales representatives and distributors. Sweet's has always recommended this move as a means of making catalogs of greater use to you—and obviously of greater benefit to manufacturers.

When you fail to find the local representative so listed, the nearest Dodge office is at your service.*

Some manufacturers, as you know, have their representatives register directly in the Sweet's file in your office. Architects have asked us if we object to this practice. We certainly do not object. We encourage it as we encourage anything that will make Sweet's more useful and convenient to you.

As it is our aim to make the Sweet's file complete, not only in this respect but in all others, we will appreciate your reporting instances of omission of essential information of any kind which come to your notice.

**Each of the eighteen Dodge offices listed below maintains a registry service for the mutual benefit of architects and sales representatives. 'Phone, write or wire the office nearest you.*

ATLANTA, 310-14 Red Rock Bldg.
BALTIMORE, 11 North Calvert Street
BOSTON, 31 St. James Avenue
BUFFALO, 220 Delaware Avenue
CHICAGO, 105 West Adams Street
CINCINNATI, 800 Broadway
CLEVELAND, 1422 Euclid Avenue
DALLAS, 401 South Akard Street
DETROIT, 607 Shelby Street
KANSAS CITY, 215 Pershing Road
MILWAUKEE, 125 East Wells Street
MINNEAPOLIS, 407 South 4th Street
NEW ORLEANS, 326 Balter Bldg.
NEW YORK, 119 West 40th Street
PHILADELPHIA, 1321 Arch Street
PITTSBURGH, 106 Sixth Street
ST. LOUIS, 721 Olive Street
WASHINGTON, 1340 G Street, N. W.

As We Were . . .

CLUSTER FIXTURE

LIGHTING FIXTURES— 1906. *If you wanted light you got it without apology from this handsome ceiling piece of the early twentieth century. Apparently it not only flooded a room with light, but submerged it. Nevertheless, it was a leader in its day and appeared, quite naturally, in a manufacturer's catalog filed in the Sweet's of that period.*

POETS' CORNER

There was a man in our town
And he was wondrous wise.
He always claimed to have more brains
Than all the other guys.

At any but his own ideas
He'd never even look.
Advice was something that he gave
Away, but never took.

And when he got the notion
To modernize his home,
He'd not admit the F. H. A.
Had put it in his dome.

"I won't retain an architect
"To do this job," said he;
"I'll save no end of argument
"And also save the fee."

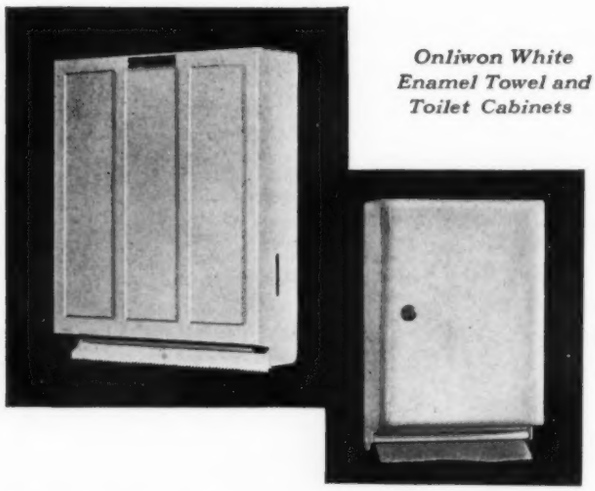
He hired a gang of carpenters,
A plumber and a mason,
To each he gave his home-made plans
And cautioned them to hasten.

"Remember, every one of you,
"In seven weeks from Friday
"I'm coming back and want to find
"The place all neat and tidy."

He confidently figured what
His daring had availed him;
But when he saw the finished job,
His respiration failed him.

Now o'er his final resting place
The squirrels frisk and caper.
He'd found how different things can be
From what they seem on paper.

Washrooms will STAY Modern if you specify Onliwon



Onliwon White Enamel Towel and Toilet Cabinets

Whether your plans involve new construction or modernization of existing buildings, your specifications have an important bearing on *how long* the structure will stay modern. You can be sure of washroom fixtures that will never grow out-of-date by specifying A.P.W. Onliwon Towel and Tissue Cabinets. These fixtures insure economy by dispensing one towel or two sheets of tissue at a time. They assure added protection to health by keeping the remainder effectively protected from dust, dirt and unnecessary handling at all times.

A.P.W. Towels and Tissues, themselves, have set a standard for quality for more than half a century. They are used in more hotels, hospitals and institutions than any other today. It's no more than common sense to take advantage of this widely recognized background of quality in making sure every detail of your specifications reflects full value for your clients.

The new A.P.W. Catalogue, No. 45, gives complete listings of the full line of A.P.W. fixtures, including prices and dimensions. It supersedes all previous lists—so send for it today. Here's the coupon that will bring it to you without cost or obligation.

NRA CODE

A.P.W.

A. P. W. PAPER CO., ALBANY, N. Y.

Gentlemen:

Please send me at once without cost or obligation your 1934 Catalogue, No. 45.

Name.....

Address.....

City.....*State*.....

L-10
ABRASIVES

For the building field the Norton Company manufactures permanently non-slip stair and floor tile, ceramic and mosaic tile, and several other products. Alundum abrasive, an aluminum oxide, is the basic material used. The Norton Company has published a well illustrated and interesting booklet which tells of the wide variety of industrial applications of this abrasive. A preface reviews the history of the use of natural abrasives and of the development of modern, more efficient, artificial abrasive materials.

L-11
A HEATING PLANT OF 120 OIL FURNACES

The central heating plant recently put in operation at Mount Holyoke College, South Hadley, Mass., consists of 120 General Electric oil furnaces. From the standpoint of operating economy it was logical that the close automatic control of a system in which only as many of a great number of small units were operated at one time as were needed to supply the heating demand of the moment, would result in a most satisfactory operating cost.

The new heating plant is a one-storied steel-brick-and-concrete building set back into the grassy slope at the lower edge of the campus, its roof covered with soil, grassed over, and forming a part of the slope itself. At one end of the room in which the rows of units are housed is a control bay containing a panel board with indicator lamps corresponding to the individual furnace units to indicate those in operation. Pilot indicator lamps also show the operating condition of the induced draft blowers. These blowers draw away the products of combustion, gases, which form as the furnaces burn; they have nothing to do with the burning of the fuel.

The furnace battery and its control automatically preserve the proper steam pressure in the system. The amount of steam admitted to the 24 buildings controlled by the system is determined by a separate automatic control system consisting of electrically operated valves at the buildings themselves, and a thermostatically controlled electric cycling mechanism located at the central plant. In this steam control system, developed by the

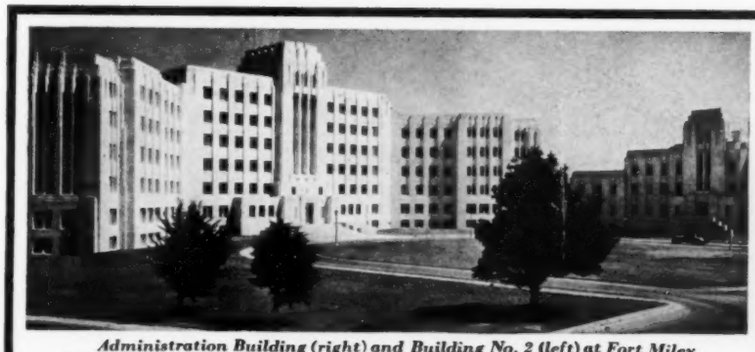
Building No. 2 of the Veteran's Administration Group, Fort Miley, San Francisco, California, glazed throughout with Pennvernon Window Glass. Architect: Veteran's Administration, Construction Service. General Contractor: Herbert M. Baruch Corporation, Los Angeles. Glazing Contractor: W. P. Fuller & Co., San Francisco.

Pennvernon Window Glass...

The Nearest Approach to Plate Glass Perfection Yet Achieved in Sheet Glass Manufacture

ARCHITECTS in increasing numbers are specifying Pennvernon Window Glass as the glazing material for the buildings they design. The reason is simply this: that Pennvernon offers advantages which only polished plate glass can surpass.

Made by a special process from the purest, most carefully selected ingredients, Pennvernon affords remarkably clear, undistorted vision. Objects seen through Pennvernon appear life-like and natural, not only in size and outline but in color. This new clarity of vision assists the architect materially in taking full advantage of environmental beauty in designing his buildings.



Administration Building (right) and Building No. 2 (left) at Fort Miley, for which the architect specified Pennvernon Window Glass because it is clearer, brighter, better.

Pennvernon also combines an extremely brilliant surface finish on both sides of the sheet, with a freedom from surface waves and imperfections remarkable in sheet glass. Thus Pennvernon reflections are true reflections. And because the surfaces of the glass are uncommonly close-knit and dense of structure, Pennvernon is more durable, and more easily cleaned than ordinary window glass.

. . .

Specify Pennvernon Window Glass on your jobs. It will help you to attain greater architectural beauty. It is available in single or double strength, and in thicknesses of 3/16" and 7/32", at the warehouses of the Pittsburgh Plate Glass Company in most leading cities, and through progressive glass jobbers and sash and door manufacturers. Write for samples. Pittsburgh Plate Glass Company, Grant Building, Pittsburgh, Pennsylvania.

PENNVERNON
WINDOW GLASS

Warren Webster Company, steam is admitted to each building once every five minutes, the length of time of admission being varied by an outdoor thermostat at the central plant. The time the steam is on is varied thus between 30 seconds and 4½ minutes, depending on outside temperature. A set of manual controls is provided at the central plant so that the automatically maintained temperatures in each of the buildings can be selected and set by the operator.

L-12
NEW MILCOR PRICE LIST

The new Milcor 1934 Price Books are now distributed. They contain 128 pages of the latest price information selling data and illustrations of the Milcor Line of Sheet Metal Building Materials and Accessories. The book is completely revised and shows many new products and innovations in the sheet metal building line. A new indexing system simplifies the location of certain products and groups various materials according to type. The Standard Roofing Table and Standard Bundling Table on Sheets are included in the book.

L-13
WESTINGHOUSE ANNOUNCES NEW WATER HEATER

A new automatic electric water heater, capacity 30 gallons, to retail for $57.30 F. O. B. Mansfield is announced by the Westinghouse Electric and Manufacturing Company. Especially suitable for domestic use. Outstanding features include: new type thermostat for adjustable automatic temperature control; hermetically sealed Corox looped hairpin heating element with provisions for the addition of another element for larger capacities; a Morocco Krinkle finish which cannot chip, crack or craze and which is bright as enamel, tough as lacquer and easy to clean.

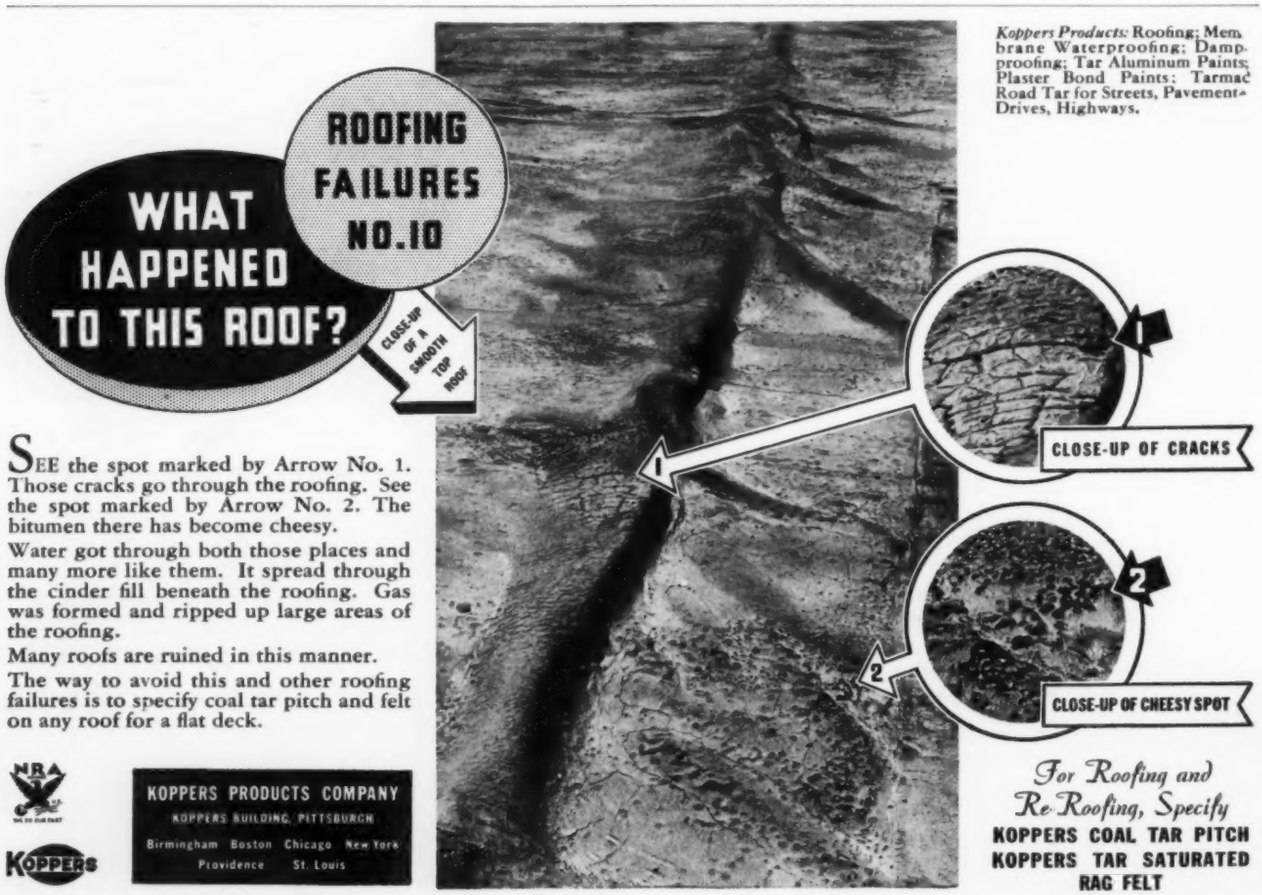
TRADE ANNOUNCEMENTS

NEW EXPORT COMPANY FORMED

The Ferro Enamel Corporation, Cleveland, Ohio, announces the formation of an Export Division for the purpose of marketing Ferro Enamel supplies and equipment in foreign countries not reached by the Ferro Subsidiaries in Canada, England, France and Holland.

CRANE CO.

Crane Co. announces the transfer of Mr. P. R. Mork from New York to the general office in Chicago where he will serve as Vice President in Charge of Sales. In his new position he will assume the duties of Vice President H. W. Seymour, who is on leave of absence due to ill health. Mr. P. R. Berryman, formerly Vice President of the Trenton Potteries, succeeds Mr. Mork as Manager of the New York branch and associate branches of Crane Co. in the metropolitan area.



Koppers Products: Roofing; Membrane Waterproofing; Damproofing; Tar Aluminum Paints; Plaster Bond Paints; Tarmac Road Tar for Streets, Pavements Drives, Highways.

SEE the spot marked by Arrow No. 1. Those cracks go through the roofing. See the spot marked by Arrow No. 2. The bitumen there has become cheesy.

Water got through both those places and many more like them. It spread through the cinder fill beneath the roofing. Gas was formed and ripped up large areas of the roofing.

Many roofs are ruined in this manner.

The way to avoid this and other roofing failures is to specify coal tar pitch and felt on any roof for a flat deck.

NRA WE DO OUR PART

KOPPERS

KOPPERS PRODUCTS COMPANY
KOPPERS BUILDING, PITTSBURGH
Birmingham Boston Chicago New York
Providence St. Louis

For Roofing and Re-Roofing, Specify
KOPPERS COAL TAR PITCH
KOPPERS TAR SATURATED RAG FELT